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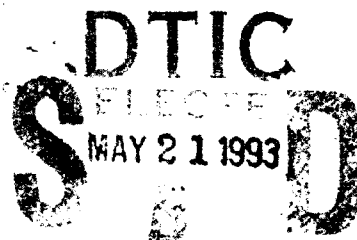
**CULTURAL RESOURCES MITIGATION  
ALONG DITCH 19,  
SITE 23DU227, DUNKLIN COUNTY, MISSOURI**

Contract No. DACW 66-83-C-0044

by

**Jeyne Bennett, M.A.  
Principal Investigator  
and  
David A. Higginbotham**

**with contributions by  
Linda J. Scott, M.A.  
and  
Rhoda O. Lewis, M.A.**

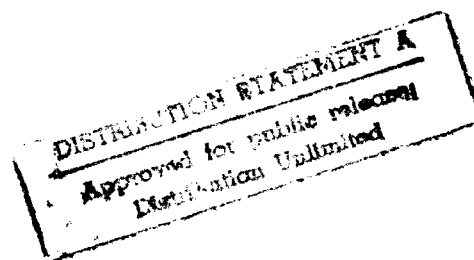


Report Submitted to:

**Department of the Army  
Memphis District, Corps of Engineers  
B-314 Clifford David Federal Building  
Memphis, Tennessee 38103**

Prepared by:

**AR Consultants  
P. O. Box 820727  
Dallas, Texas 75382**



Cultural Resources Report 84-8

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## ABSTRACT

Environment Consultants, Inc. (ECI) conducted a cultural resources mitigation of a portion of archaeological site 23DU227 in Dunklin County, Missouri. That portion of the site is to be impacted by the expansion of Ditch 19 by the U.S. Army Corps of Engineers. Ditch 19 bisects the site. A segment of the site was reported as existing under the present levee fill for the ditch. The purposes of this study were to record the effects of levee construction, i.e., placement of fill materials, on archaeological sites and to mitigate the effects of construction on 23DU227. After intensive field investigation consisting of 100% surface collection, 1 x 1 m excavation units, and backhoe trenching, it was discovered that the cultural materials on this portion of 23DU227 represent a separate locus of artifacts. There is no evidence of continuation of site 23DU227 across Ditch 19. Therefore, the effects of levee construction could not be determined. However, field and laboratory analysis did delimit another site approximately 326 m<sup>2</sup> beginning about 25 cmbs and extending to a depth of around 60 cmbs. The materials appear mixed within the cultural layer with no stratigraphic differences noticeable. The temporal diagnostics date the site from the late Archaic through Mississippian periods. There is a good possibility of pollen and phytolith interpretation. It is recommended that this locus of artifacts be assigned a new site number.

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The town of Malden, Missouri, is thanked for the help and courtesy they extended to the crew. Betty Arnold of the Malden Chamber of Commerce proved to be a valuable source for locating goods, services, and information. Don Neeley of Greenway, Arkansas, served as our backhoe operator. Without his prompt assistance and excellent ability in operating a backhoe, the fieldwork would not have been completed in its time frame. I would like to thank C.V. Bennett for helping me to locate Mr. Neely and for attending me while I was monitoring the backhoe work.

Various people assisted me with the fieldwork, analysis, and report preparation. Maria Brent served as crew chief and aided in project organization and some laboratory analysis. Crew members were Joseph Brent, J.W. Demaree, David Higginbotham, Laura Jackson, and Pam Stovall. All worked in the field, and all washed and processed artifacts on rain days. In Dallas, David Higginbotham and Midge Pachter served as excellent laboratory and research assistants. David also prepared line drawings and helped write sections of the report. NRS & Associates prepared several line drawings. S. Alan Skinner provided technical assistance on lithic analysis and helped in final report preparation. To Linda Scott of Palynological Analysts, I extend my appreciation for providing me with pollen and phytolith results within the time I needed them. Lillie Weeams proved to be a capable word processor and is sincerely thanked for helping in turning out this report. Barbara Hawkins of Professional Services Unlimited completed the final word processing.

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## I. INTRODUCTION

The U.S. Army Corps of Engineers, Memphis District, is proposing an enlargement project of the existing Ditch 19 in Dunklin County, southeast Missouri (Figures 1, 2 and 3) to serve in their flood control program. Construction involved with the enlargement will impact an archaeological property, 23DU227, determined eligible for inclusion on the National Register. In response, the Corps of Engineers developed a plan to mitigate the impacts to the site by utilizing a program of systematic surface and subsurface analyses. The mitigation plan, in the Scope of Work, included investigation, data recovery, analysis, interpretation, and report preparation (Appendix A). The mitigation and subsequent report represent fulfillment of compliance requirements of the Corps of Engineers, Memphis District, toward cultural resources as required by the National Environmental Policy Act of 1969 (PL91-190); National Historic Preservation Act of 1966 (PL89-665); Protection and Enhancement of the Cultural Environment (EO 11593); Advisory Council Procedures for the Protection of Historic and Cultural Properties (36 CFR 800); Preservation of Historic and Archeological Data 1974 (PL 93-291); and Identification and Administration of Cultural Resources (33 CFR 305).

Site 23DU227 is located in a soybean field in Dunklin County, southeast Missouri. When the site was initially recorded by Iroquois Research Institute (1979), it was described and drawn as being bisected by Ditch 19 which runs almost north/south through the site (Figure 4). The portion of the eastern extent of the site is approximately  $80 \times 700 \text{ m}^2$ . The site extent on the western portion was recorded as being  $75 \times 100 \text{ m}^2$ . Only the eastern portion of the site was subjected to archaeological investigation by Iroquois.

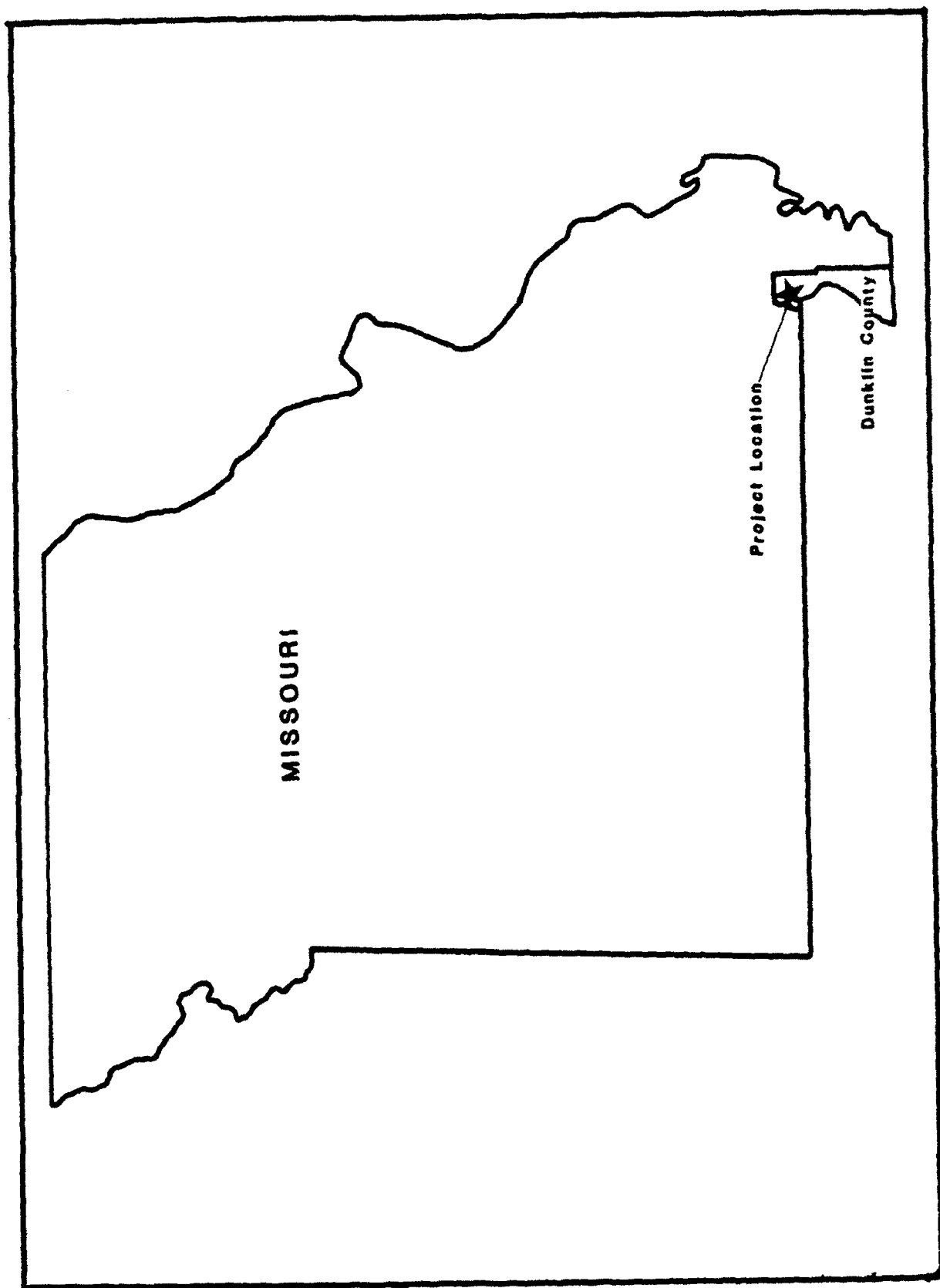


Figure 1. Map of the State of Missouri with project location indicated.

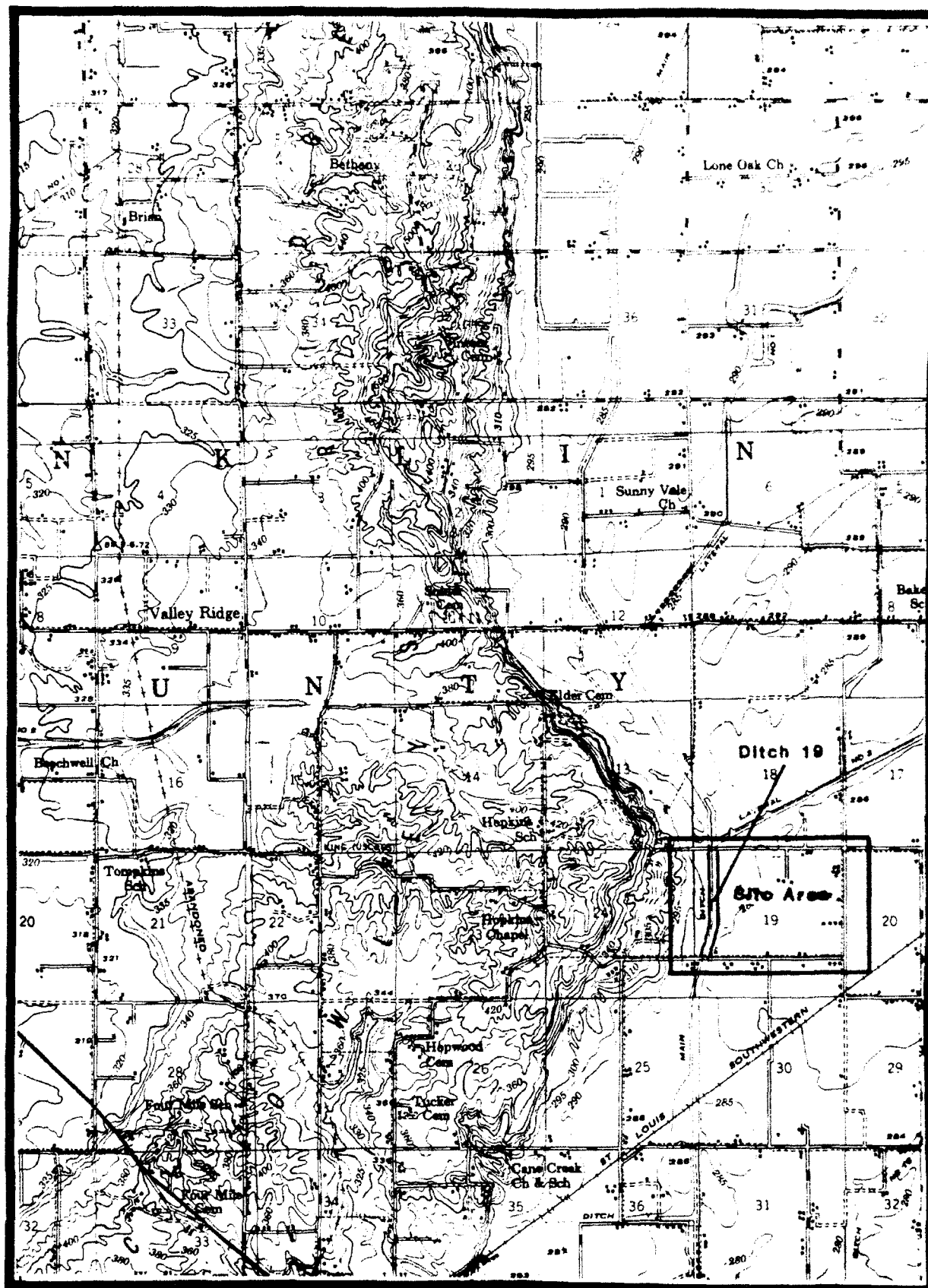


Figure 2. Location of Ditch 19 from Valley Ridge, Missouri  
USGS 15' map.



Figure 3. View of Ditch 19 looking south from a bridge southeast and adjacent to site 23DU227.

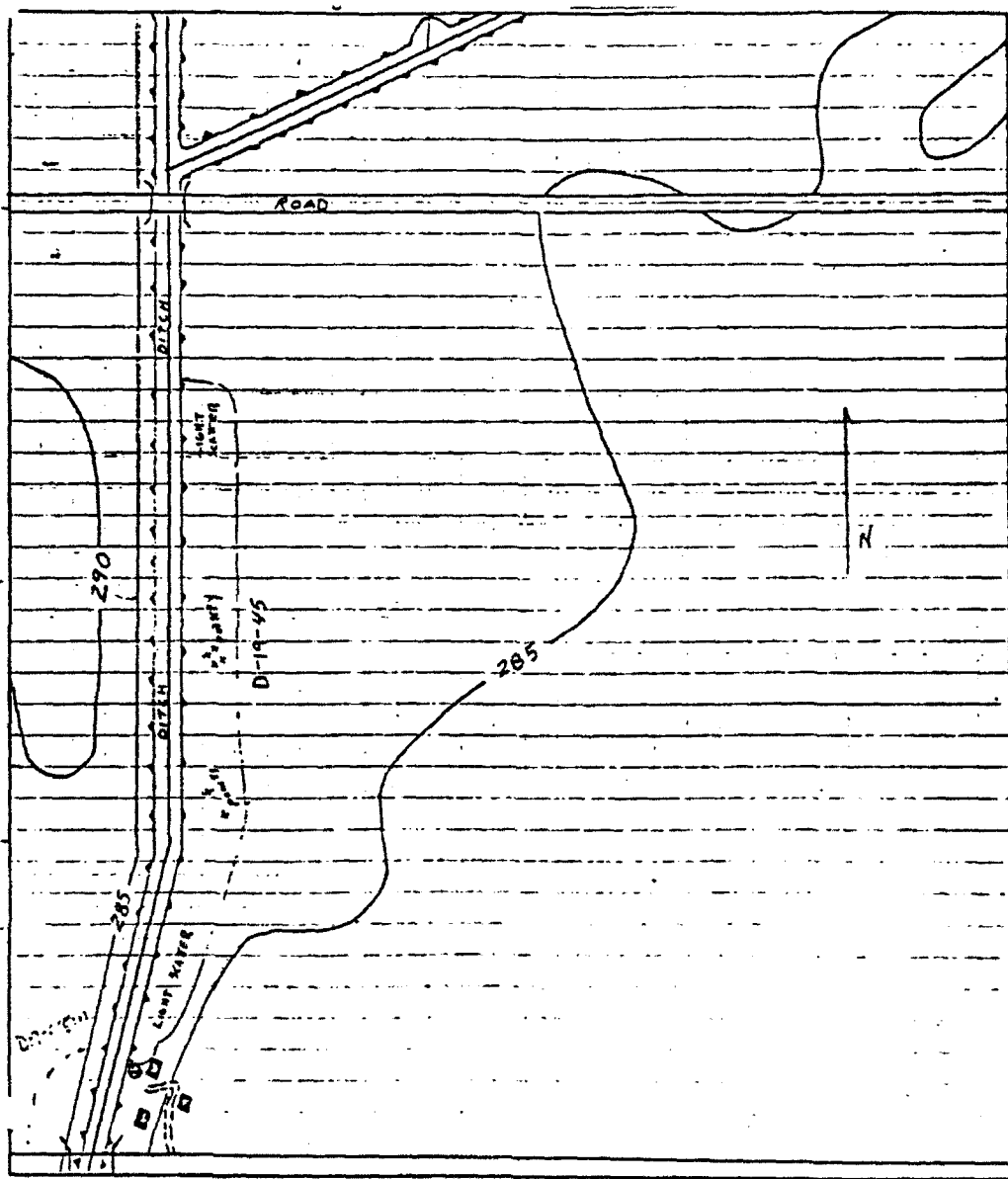


Figure 4. Iroquois Research Institute field sketch map site 23DU227 area.

This investigation was in the form of testing consisting of shovel tests, controlled surface collections, and test excavations (Iroquois Research Institute 1979). The following report provides a description of the mitigation performed on the western portion of the site. It is the only portion of the site which will be impacted by this proposed enlargement of Ditch 19.

Environment Consultants, Inc. (ECI) was contracted by the U.S. Army Corps of Engineers to conduct the cultural resource mitigation of 23DU227. The mitigation was designed in stages with ECI contracted for Stages I and III. Explanation of Stages I and III is expanded in "Methodology." Fieldwork began May 9, 1983, and a crew of seven was used. This crew consisted of the Principal Investigator, crew chief, and five crew members. On rainy days, the crew washed and analyzed artifacts. Fieldwork was concluded May 27, 1983, and a partial crew returned to Dallas, Texas, to finish analysis and prepare the report. Artifacts and records generated by this investigation are curated at Washington University in St. Louis, Missouri.

## II. BACKGROUND

### NATURAL ENVIRONMENT

The Ditch 19 Channel Enlargement Project lies within the Malden Plain which together with Sikeston Ridge and the Western Lowlands comprise the Dissected Older Alluvium. The Dissected Older Alluvium is one of the three basic geological formations making up the Central Mississippi Valley, a subdivision of the Mississippi River alluvial valley. The other two geologic formations are the Tertiary and Old Uplands comprised of Tertiary erosional remnants of which Crowley's Ridge is a significant feature, and the Recent Alluvium consisting of the Eastern Lowlands (Fisk 1944). Crowley's Ridge bisects the Central Mississippi Valley into the Eastern and Western Lowlands, and bounds the project area on the western edge of Ditch 19. Crowley's Ridge has been shown to have the potential for providing lithic materials, salt, pigments, and gravels for use by prehistoric inhabitants of the project area (J. Price et al. 1978 and Klinger et al. 1981).

As mentioned earlier, Ditch 19 is located within the Malden Plain which

"is bounded on the west by the present channel of the St. Francis River, on the east by the Little River Lowland and on the north by Crowley's Ridge. The Malden Plain is a portion of the abandoned alluvial fan of the Ohio River and is the only considerable area of older alluvium in the Eastern Lowlands (Phillips, Ford, and Griffin 1951:15).

The St. Francis follows an abandoned main channel of the braided Ohio system across the Plain (Fisk 1944:26). The major topographic features of the Malden Plain are braided stream terrace surfaces. These natural features have, however, been greatly



altered by erosion, siltation and intensive agricultural activities" (Klinger et al. 1981:19).

In the twentieth century, the Malden Plain has been subjected to several drainage projects in an attempt to control flooding by the Mississippi, St. Francis, Castor, and Little rivers. The St. Francis also served as the major drainage of the Plain before the projects. Other changes in the Plain were caused by extensive lumbering. Activities involved with railroad construction and maintenance also severely altered the environment (Gurley 1979:2). Gurley (1979) and Shelford (1973) indicated that the area was heavily forested and populated by many floodplain plant communities, associated fauna, reptiles, amphibians, fish, and birds. The changes in Malden Plain have served to reduce the biotic communities to around 2% of their original size (Shelford 1963:91; Klinger et al. 1981:16-19).

The Gideon-Lilbourn Association and the Sharkey Association constitute the principal soil associations for the project area. Gideon-Lilbourn Association is the major soil association covering three-fourths of the project area. This association was formed in loamy drainageways, and the soil is deep, nearly level making it a poorly-drained soil. Sharkey Association is also nearly level and poorly drained. This association is a clayey soil that formed in alluvium deposited in slack water (USDA 1975; Iroquois 1979).

### Culture History

Table 1 synthesizes the following information.

Table 1. Culture historical chronology represented in the project area  
(derived primarily from S. Williams 1954; Phillips 1970; J. Williams 1974)

	Cultural Tradition	Cultural Periods and/or Phases	
A.D. 1500	Mississippian	Armoreal	
		Pemiscot Bayou	
		Cairo Lowland	
		Hayti or Early Malden Plain	
A.D. 1000	Woodland	Coles Creek	
		Baytown	Hoe Cake
		Dunklin	
		Marksville	LaPlant (Barnes Ridge)
1000 B.C.	Archaic	Tchula	Pascola
		Poverty Point Affiliations	
8000 B.C.	Paleo-Indian		

#### Paleo-Indian (c.a. 12,000 - 8000 B.C.)

Relatively little is known about the peoples of the big-game hunting period known as Paleo-Indian. "The Paleo-Indians lived in grassy and swampy plains of North America at the close of the Pleistocene period. Much of their livelihood was gained from the specialized hunting of such large animals as the mammoth, camel, horse, and an archaic form of bison, all of which are now extinct" (Hudson 1976:39). It is presumed that these peoples did not rely on big game as their sole food source but also hunted smaller animals as well as gathered wild vegetable foods. However, the preservation of these items is such that any evidence remaining has long since deteriorated.

The lithic tools related to this period are characterized by lanceolate fluted and basally thinned projectile points. Throughout southeast Missouri, evidence of Paleo-Indian occupation is limited to isolated finds of Clovis and Folsom-like fluted points of exotic cherts. There has been no other cultural material or information recovered from this period in this area.

#### Archaic (8000 - 1000 B.C.)

As the ice of the Pleistocene period melted, the cold-adapted animals became extinct, and the Paleo-Indian hunting tradition slowly changed. An increasing reliance on smaller game and wild vegetable foods developed into a highly diversified and efficient subsistence pattern with the Archaic people becoming more and more sedentary. These changes created a lifestyle somewhat more complex than that of the Paleo-Indian tradition.

In southeast Missouri, Archaic period occupations include both extensively occupied midden sites along river channels, sloughs, or swamp margins and less intensive artifact scatters on relatively low ground. Little cultural material has been recovered in this area relating to the earlier portions of this period. Diagnostic artifacts are primarily of the Dalton type (Klinger et al. 1981). Even less is known of the Middle Archaic peoples; however, there is some knowledge of the inhabitants of the area at the close of the Archaic.

"A picture of the Poverty Point complex is unfolding which indicates it to have been a major, long-lasting and widespread cultural manifestation" (Webb 1968:297). "It is clear that during terminal Archaic times, Poverty Point influences reached this area" (Klinger et al. 1981:38). Sites near the project area "have produced such Poverty Point-like artifacts such as clay balls" (Klinger et al. 1981:38). Lithic artifacts related to the terminal Archaic cultural and chronological period include: "large and small stemmed and notched projectile point forms; full-grooved ax; (and) winged bannerstones" (Klinger et al. 1981:36).

#### Woodland (1000 B.C. - A.D. 1000)

The Woodland period is a period of increasing social complexity and population growth. The innovations that are hallmarks of this period grew out of patterns established in the Archaic period. The use of pottery became widespread with form and decoration being locally stylized. Agriculture was beginning to be practiced and was becoming a supplementary means of subsistence to the hunting and gathering practiced (Hudson 1976).

In this area, Early Woodland culture is identified as the Tchula period or Pascola phase. This phase is associated with pinched, punctated, and incised decorated ceramics as well as stemmed, contracting stemmed, and notched projectile points. The following period is known as the Marksville Period or La Plant (Barnes Ridge) Phase. This is a poorly known phase in this area; however, dentate sand-tempered ceramics and other "Hopewellian-like" materials have been associated with this period. The next period is known as the Baytown Period, and it is comprised of two phases, the Dunklin Phase and the Hoe Cake phase. The Dunklin phase is identified by sand-tempered Kennett Plain and Barnes Cordmarked ceramic types. The Hoe Cake phase is identified by clay-tempered ceramics such as Baytown Plain, Mulberry Creek Cordmarked, and Larto Red-Filmed ceramic types. The final period is known as the Coles Creek period. It is postulated that the Dunklin phase, and its associated artifact types, continued through this period (Klinger et al. 1981).

#### Mississippian (A.D. 1000 - 1500)

Cultural development is considered to have reached its pre-European peak in the Mississippian period. This period saw a heavy reliance on agriculture with a decreased dependence on hunting and gathering subsistence patterns. The sites of this period are generally larger and include a well-developed village organization with permanent structures and the presence of domesticated food storage facilities. Traits considered representative of this period include the use of the bow and arrow and the production of distinctive ceramic vessel shapes and surface decorations.

The early part of this period is identified as the Hayti or Early Malden Plain phase in this area. This phase is represented by shell-tempered ceramics such as Neeley's Ferry Plain and Varney Red-filmed ceramic types. Vessel shapes include jars without appendages and with outflaring rims and steeply angled shoulders, as well as hooded bottles. Lithic tools include small arrow points as well as other tools previously introduced. The Middle Mississippian period is known as the Cairo Lowland and Pemiscot Bayou. The phases are associated with shell-tempered ceramics such as Neeley's Ferry and Bell Plain ceramic types and include a variety of decoration techniques. A variety of small arrow points are still in widespread use. The last phase of this period is known as the Armoreal phase. Exemplary artifacts include the Bell Plain and Neeley's Ferry Plain ceramic types as well as various applique, incised, noded, painted, and punctuated decoration techniques. Bone "buttons" also have been recovered as well as willow leaf and small triangular arrow points, snub-nosed scrapers, and small amounts of historic trade goods (Klinger et al. 1981).

#### Historic (A.D. 1500 to Present)

This area appears to have been largely abandoned by native peoples in the historic period. The native populations described by DeSoto were no longer in existence by the time the French began to penetrate the area. However, the Spanish in an effort to discourage English and American interests, later encouraged eastern Indians to settle in the Mississippi Delta. Consequently, several Cherokee, Shawnee and Delaware villages have been reported in the area (Goodspeed 1888; Houck 1908; J. Price, Morrow and C. Price 1978).

After the American government gained control of the area through the Louisiana Purchase in 1803, the Indians were considered less of a threat. By 1832, the last of the Indians had been removed, and the area was very slowly settled by Euro-American peoples. Dunklin County was officially organized in 1846, but remained basically a hunting-farming economy, due to poor drainage, until the 1890s. With the construction of railroads (1890s) through the area, Dunklin County relied less and less on the fur trade and more on logging (Iroquois Research Institute 1979).

During the Civil War most of the people in the area were Confederate sympathizers. Relatively minor skirmishes occurred in the area, and a Confederate steamboat was captured in 1862 at Hornsville. After the war Dunklin County returned to prewar conditions until the railroads made transportation more available. As mentioned above, logging became a major component of the local economy until the forests were cleared, at which time the wealthy lumber companies began major drainage projects. The projects facilitated the farming of the land, and the large landholders implemented the sharecropper system. Surviving the difficulties of the Depression era, Dunklin County economy remains agriculturally based. Boosted by improved mechanization nearly 85% of the land in this county was in production by 1954 (Shoemaker 1958).

### III. RESEARCH DESIGN

#### INTRODUCTION

The function of a research design is to "provide the researcher with a vehicle to express and to develop explicitly the rationale behind the proposed research" (McGimsey and Davis 1977:72). The need for a vehicle for archaeological investigation has developed as archaeology has turned from an inductive means of gathering data to a deductive one. According to Hill (1972), the inductive approach to research is impractical and inefficient in that it is based on the false premise that a researcher can go into the field with an open and unbiased mind, collect a massive amount of basic data suitable for a variety of subsequent analyses not yet formulated, and prepare a synthesis and interpretation of the investigation. Hill further states that because there are almost infinite data that can be collected by a researcher, there needs to be a framework for collecting and organizing the data. This framework is made in the light of preconceived ideas, one of which is theories. He sees theories as guiding the selection of research problems or domains which in turn define the nature of the data to be collected as well as to guide the interpretation.

Unfortunately, the result of the attempt to place archaeology within a theoretical framework has been the production of an extensive amount of theoretical literature, referred to as a high level of abstraction by Binford (1977). He also notes the continuation of strictly methodological reports (a low level of abstraction). He indicates that there needs to be a middle-range ground, or a reconciliation of method



and theory (Gumerman 1977:97-106). The proposed research for this project served as a vehicle for expressing this rationale, in that it attempted to reconcile theory and method. The theory was provided through the following seven research domains. The method was provided in the following chapter. The two were reconciled in that the methodology for the field and laboratory was based entirely on providing data for dealing with the research domains.

The research domains that were dealt with during this investigation are presented in the following text. The research questions for each domain which was pursued are presented. These domains and research questions are excerpted in part and in whole from the RFP (Appendix A). This organization directed our field and laboratory work in a efficient, straight-forward manner. These research domains are not in order of significance or priority. Additionally, these investigations at 23DU227 proved the research domains to be quite optimistic. However, they are provided to indicate the rationale or direction behind the methods.

#### RESEARCH DOMAIN #1: EFFECT OF LEVEE CONSTRUCTION

The construction of levees is a necessary part of the development of flood control projects. It is an obvious fact that the excavation of a structure, such as Ditch 19, is a totally destructive one to archaeological sites; however, it is not known whether or not construction of a levee, exclusive of borrow areas, is destructive to archaeological sites. The purpose of this domain was to measure the effects of levee construction, i.e., fill materials over a site area. The research questions sought to be answered were:

1. What effect does the placement of fill materials on a site have on the site subsurface stratigraphy?
  - a. Is the stratigraphy under the fill material different from that outside the fill?
    - (1) Is the stratigraphy more compressed under the fill?
    - (2) Is the stratigraphy deformed because of the fill weight?
    - (3) Is the stratigraphy under the fill wetter or drier?
  - b. If there is stratigraphic compression beneath the fill material, is it uniform in all test areas?
2. What effect does the placement of fill material on the site have on buried artifacts?
  - a. Does there seem to be a greater amount of artifact breakage under the fill than on the surface?
    1. Was this artifact breakage on the original ground surface or under the original surface?
    2. Does the artifact breakage seem to have been caused by contact with equipment or because of excessive ground pressure?
  - b. Are the artifacts from one stratum pushed into other stratum because of the excessive fill weight?
  - c. Does there seem to be a physical or chemical change (brittleness, oversaturation, etching, precipitants, etc.) to the artifact, which is caused by excessive or too little water and chemicals interaction?

- d. Are there more or less organic artifacts preserved under the fill than in the unfilled portion of the site?

## RESEARCH DOMAIN #2: SITE DEFINITION

Artifacts from test units were used in conjunction with the surface collection materials to better define the site boundary, component identification, and activity areas.

1. What is the horizontal and vertical extent of the site beneath the existing levee?
  - a. Does the site extend to the ditch edge?
  - b. Does the vertical site depth increase toward or away from the ditch bank?
2. What cultural components are present at the site?
  - a. What is the temporal span of each component?
  - b. What is the temporal relationship between the components?
  - c. Are the cultural components found on the site surface reflected in the subsurface deposits?
3. What, if any, are the relationships between each of the components and contemporary socio-cultural systems?

## RESEARCH DOMAIN #3: SUBSISTENCE PATTERNS

Information was sought which would determine types of animal food resources, changes in subsistence patterns through time, possible domestication, and the introduction of European animals. This information was used to answer such questions as:

1. What natural resources were selected for food?
  - a. How important was Prairie exploitation to each component?
  - b. How important were upland resources to each component?
  - c. How important were lowland resources to each component?
  - d. How important were deer, raccoon, turkey, and dog as food resources to each component?
2. What, if any, cultigens and domesticated animals were utilized?
  - a. What native cultigens were used?
  - b. Were cultigens brought in from other non-European sources?
  - c. Is there evidence of salt production from plants in any of the components?
  - d. Is there evidence of corn horticulture in any of the components?
  - e. Does the dependency on corn agriculture increase through time?
  - f. Is there indication of the use of European cultigens and/or domesticated animals by the native population?
3. How did the subsistence pattern change through time? If so, what caused these changes?
4. Do the subsistence resources indicate seasonal or permanent settlements?

#### RESEARCH DOMAIN #4: HUMAN OSTEOLOGICAL STUDIES

If human remains were encountered, they were to be drawn, mapped, and photographed before being removed from the feature. The remains were to be analyzed in an attempt to determine age, sex, stature, and disease and nutrition patterns. If burials were numerous, an attempt would have been made to determine the group population size.

The questions that would have been asked of the burials were as follows:

1. What was the orientation of each burial?
  - a. What was the head direction of the burial?
  - b. In what position (flexed, extended, sitting, etc.) was the burial?
  - c. What artifacts were found with each burial?
2. What are the physical characteristics of the burials?
  - a. What physical characteristics were different between burials from different components?
    - (1) Are there indications of cranial deformation?
    - (2) Was the cranial deformation in the front or back of the head?
  - b. What is the sex of each burial?
    - (1) Are male burials more predominant than female burials?
      - (a) Does this vary between components?
  - c. At the time of death, what was the estimated age of each burial?
    - (1) What seemed to be the average death age for each component?
    - (2) What was the average death age for men, women, and children?
  - d. What was the stature of each burial?
    - (1) What was the average male and female stature for each component?
    - (2) Was the average stature greater or smaller than that from other sites?
  - e. What diseases are indicated by the burials?
    - (1) Were the diseases the same for all components?
    - (2) Were any of the diseases related to nutrition?

- (3) Were any of the diseases sex related?
- f. Are there indications of contact with European diseases?
- 3. Is there evidence of burial ceremonialism?
  - a. Which culture component seems to have the most elaborate burial ritual.
  - b. What type grave goods were found with the burials?
    - (1) Were more burial goods left by one component than another?
    - (2) How did the burial goods for men, women, and children vary?
      - (a) How did the arrangement of these goods vary?
      - (b) Do any of these associations indicate social stratification or status differential?
  - c. Is there evidence of secondary reburial?
  - d. Is there evidence of European style burial?
- 4. Were the burials associated with houses or other features?
  - a. How did this vary with each component?
  - b. Were the associations intentional or by chance?
  - c. Do any of these associations indicate social stratification or status differential?
- 5. Is it possible from the number of burials found to make a population estimate for each component?
- 6. How does the physical, ritual, and burial information compare to that obtained for corresponding cultural components at other sites in the region?

## RESEARCH DOMAIN #5: REGIONAL AND AREA SITE RELATIONSHIPS

The intent of this research domain was to relate the information provided by the mitigation of this site to the region. Of prime importance was an attempt to relate the past regional environment with site specific and site regional settlement strategies. This information was related to the following questions:

1. What was the general nature of the past regional environment?
2. What detailed characteristics of each component are found in past microenvironments?
  - a. How did local landforms relate to these environments?
  - b. How did the local biotic communities relate to these environments?
  - c. How did the local soil associations relate to these environments?
  - d. How did landforms, biotic communities, and soil associations determine the natural parameters within which this settlement strategy had to operate?
  - e. How did it help determine associations with other sites within the same time period and region?
3. What was the adaptive ecological microcosm for each of the components?
4. What factors (environmental, geomorphological, biotic, technological, etc.) helped determine this site location for each component?
  - a. How does this site and these factors relate to other sites in the local area?
  - b. Are all the factors the same for each site?
5. What soil type is the site located on?
  - a. What is the distribution of size of known sites in this area that are on the same soil type?

- b. What is the anticipated distribution of sites in this area that are on the same soil types?
  - c. What type of land forms are generally associated with this soil type?
  - d. How are the basic soil types associated within the local catchment areas.
- 6. Were each of the components site seasonal, year-round, or permanent?
  - a. If seasonal, at what season was the site occupied?
  - b. What floral, faunal, and artifactual remains indicate this?
- 7. What was the site function for each component?
  - a. What range of activities are represented?
  - b. Are there indications of palasading in any of the component areas?
- 8. Are house patterns evident?
  - a. How do the house patterns vary from each component?
  - b. How do the house patterns from this site compare with sites of equal culture and age from other areas?
  - c. What type of interior living arrangements are indicated from the living floor?
    - 1. Was cooking done inside the house?
    - 2. Were there areas that seemed to be used for some type of work (flint knapping, lapidary, etc.)?
  - d. Do artifactual remains within the house indicate a division of labor?
    - (1) What artifacts are indicative of the division of labor?
    - (2) Are the same labor division indicators present at other local sites?



## RESEARCH DOMAIN #6: TRADE

An attempt was made to determine if contemporary sites of the region traded with each other. Because a relatively minor portion of the site was excavated, precise statements on trade were not possible. However, tentative suggestions were possible. Tools, ceramic decorative motifs, and raw materials were examined in an attempt to determine any specialization which might indicate trade or other forms of interaction.

An attempt was made to answer the following questions:

1. Is there evidence of imported materials (styles, motifs, exotic raw materials, etc.) in any of the components?
  - a. Do ceramic styles and/or decorative motifs indicate an outside influence?
  - b. Are ornaments made from exotic materials?
    - (1) Are there indications that ornaments were made on the site, or before their arrival at the site?
    - (2) Are the preforms present or rough materials?
  - c. Are similar exotic materials and items found at other contemporary sites in the area?
2. Do any tools show functional modification for working the raw materials?
3. Are there indications of a lapidary industry at this site?
  - a. Are all ornaments found in a completed form?
    - (1) Were blank forms found?
    - (2) If blank beads or pendants were found, were they drilled?
  - b. Were possible manufacturing areas indicated?

- (1) Were manufacturing tools found?
  - (2) Was manufacturing trash found?
4. Are the ornaments like those found at other sites?

## RESEARCH DOMAIN #7: MATERIAL CULTURE

Within this research domain, there are three data sets. Each has its own questions which were pursued. The three data sets are prehistoric lithics, prehistoric ceramics, and historic materials. The questions are organized under these three sets. In defining and describing the material, culture historical relationships were made, e.g., using artifacts to provide relative dates.

### Prehistoric Lithic Artifacts

Component identification and relationships were studied through the analysis of diagnostic points and tools. Raw materials, manufacturing processes, typologies, and uses were studied in detail. Both macroscopic and microscopic studies of wear patterns were used to classify tools as to probable use. Raw materials and manufacturing techniques were used to compare components and explain variability. This information provided an indication of the activities carried out within various occupations.

The study of local and exotic raw materials was designed to provide insight into the varieties of these materials within specific components, specific tool forms, specific uses, manufacturing techniques, and trade. When possible, heat treatment of raw materials was documented. It was expected that the major supply of chert would be

from Crowley's Ridge with minor exotic cherts and sandstones coming from the Ozark Plateau and the Crescent Quarry area from near St. Louis. It was expected that other, more exotic raw materials, from other locations, would be found. The study of raw materials was designed to provide answers for the following questions:

1. What were the raw materials and their sources?
  - a. Were lithic raw materials brought in rough or as preforms?
  - b. Were lithic raw materials for each component the same or different?
  - c. Are there any exotic raw materials?
    - (1) What are the probable locations of the exotic raw materials?
    - (2) Were the exotics brought in rough or as preforms?
  - d. Do lithic artifact classes vary according to raw material types?
  - e. Were ornamental raw materials local or exotic?
2. Are there indications of heat treating rough materials?
  - a. Were all rough materials heat treated?
  - b. Were only selected types of lithic raw materials heat treated?
3. What is the basic artifact assemblage for each component?
  - a. Can diagnostic artifacts be used to identify each component?
  - b. Can diagnostic artifacts be used to explore phase relationships and breaks in time?
  - c. Can a typology be established?
4. What are the functional variabilities represented within the lithic assemblage?
  - a. Can these variations be used to determine what activities were carried out within the various occupations?

- b. Is there evidence of ground stone technology in any or all of the components?
  - c. Is there evidence of a lapidary industry technology in any or all of the components?
- 5. Did lithic artifact classes vary according to manufacturing techniques?
  - a. What types of manufacturing techniques were used?
  - b. Did lithic artifact classes and manufacturing techniques differ from component to component?
- 6. What relationships can be drawn from a comparison of the lithic artifacts collected from the surface on those recovered during testing?
  - a. Are the same site functions and/or activities representative, based on the two collections, independent of one another?
  - b. Are the same components represented in both collections?

#### Prehistoric Ceramic Artifacts

Ceramic analyses focused on typological characteristics (decoration and temper) and component definition at the site. Vessel shape (projected), size, temper, and paste were used to check for differences between site components. It was felt that this would determine if there was in-site development, from one component to another. Vessel size and shape may indicate use, group size, and manufacturing technology. It was expected that correlation of radiocarbon dating, stratigraphy, contextual associations, decorative motifs, and technical developments can provide insight to the development of ceramics from component to component. This information may provide answers to the following questions:

1. Were ceramics found in all components?
2. Can a ceramic typology be developed on the basis of decoration and temper?
  - a. Do different components and/or phases use different decorative motifs?
  - b. Do different components and/or phases use different temper?
3. Are there indications of "in situ" ceramic manufacturing?
  - a. Does "in situ" ceramic manufacturing appear in each component and phase?
  - b. What manufacturing techniques were used in each component?
4. Does vessel size and/or shape mark the differences between each component and/or phase?
5. Can the functional variability in the assemblages indicate what activities were carried out within the various occupations?
6. What relationships are shown from a comparison of the ceramic artifacts collected from the surface and those recovered from subsurface testing?
  - a. Are the same site functions and/or activities represented, based on the two collections, independent of one another?
  - b. Are the same components represented in both collections?

### Historic Artifacts

At the time this project was conducted, little was known about the historic component noted at the site (Jim McNeil personal communication, 1983). Therefore, the intent of this analysis was to identify and describe the historic artifacts to allow the historic occupation to be dated and defined more precisely.

#### IV. METHODOLOGY AND RESULTS

The methodology was developed in the Ditch 19 Mitigation Research Design (Appendix A) to answer questions presented in the previous chapter. The methodology has been divided into three stages. Stage I provides for a refined definition of the site and determination of the site's existence beneath the levee. If Stage I indicated the site continues beneath the levee, Stage II was designed to mitigate the site under the levee. Stage III consisted of analysis and interpretation of materials recovered from Stage I and of report writing. In this chapter, methodology and results have been combined for the sake of continuity, and they are presented under their respective stages.

##### STAGE I. SITE DEFINITION

As previously stated, this stage had a two-fold purpose. The first was to more accurately define the site's horizontal surface boundaries, establish surface artifact density clusters, and determine what components are represented on the surface. The second was to establish the existence or non-existence of the site beneath the existing fill material.

Before any fieldwork began, three permanent datum markers were established at the site. These datum markers were constructed of a high quality, high density non-ferrous metal rod. Each rod was approximately 8 cm in diameter and 1.5 m long. The rods were placed in three different areas of the site. Each rod was placed into the ground in

such a manner that the rod ends extended 5 cm above the ground surface (Figure 5). The top end surfaces of two rods were marked with an "X", as a plumb point for measurement purposes, and one was marked with a "I" and the other with a "III" for identification. The third marker was left unmarked. Datum Rod A, labeled "I", was placed at 350.000, 66.5 m from a U. S. Army Corps of Engineers marker placed on the northwest corner of a bridge, south of the site, spanning Ditch 19. Datum Rod B, left unlabeled, was placed at 355.330, 99.2 m from this marker, and Datum Rod C, labeled "III", was placed at 358.660, 129.8 m from this marker. All datum rods are indicated on the site map. All boundary marks, collection area, and test units were shot-in with the transit.

#### Controlled Surface Collection

To define reliable site boundaries and locate surface artifact density clusters, an intensive, systematic collection of the surface was conducted. All the site between the project boundary and the start of the existing fill materials had been plowed. Recent rains had watered down the surface leaving excellent surface exposure. Two base lines were established running north/south and east/west from the datum point of 0/0. At 10 m intervals, a stake was placed along the base line. A 10 x 10 m block separated into 2 x 2 m units was placed so that the corners fell on the base line. Pin flags were placed at corners of the block not marked. Each 2 x 2 m unit was numbered and collected (Figure 6). When a 10 x 10 m block was completely collected, the block was moved (Figure 7), and collecting continued until the entire area was collected.

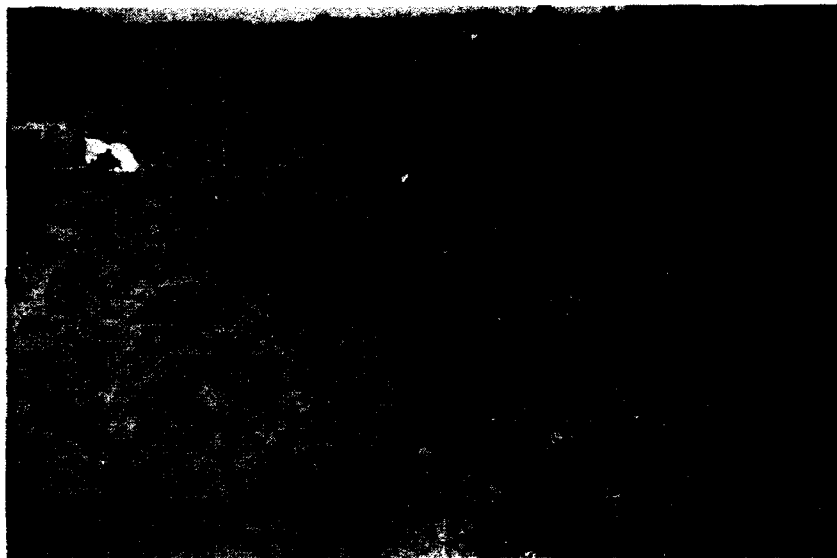


Figure 5. View of site 23DU227 looking north showing placement of datum rods.





Figure 6 View of site 23DU227 looking southwest showing crew conducting a controlled surface collection. Note Crowley's Ridge in background.



Figure 7. View of site 23DU227 looking north showing crew moving a controlled surface collection grid.

Materials collected from the surface were cleaned, sorted, and tabulated at the field laboratory. A density field map (Figure 8) was prepared to show concentrations of various artifact categories. These categories consisted of prehistoric and historic artifacts. Prehistoric categories were lithic tools (eg., projectile points, drills) other chipped stone (cores), debitage, fire-cracked rock, and ceramics. Historic artifacts were sorted into ceramics, brick, glass, metal, and other. Each category was counted and plotted on a map divided into 2 x 2 m units. This map was examined for areas of artifact concentration. Examination of the map was used to answer the following questions:

1. What is the surface horizontal extent and surface temporal span of the site?
2. What are the locations and boundaries of surface artifact density clusters?
3. Do different density clusters indicate different specialized activities and/or different cultural time periods?

A total of 512 surface collection units, 2 x 2 m in area, were collected. Of these units, 482 yielded artifacts. The rough sort artifact count recorded 2,693 artifacts: 1450 prehistoric, 546 fire-cracked rocks, and 697 historic artifacts. Debitage represents 95% (1372 pieces) of the prehistoric assemblage. In the breakdown of historic artifacts glass accounts for 62% of the historic assemblage, metal accounts for 20%, ceramics, bricks, and other materials (e.g. plastic) make up 6%. The maximum count of prehistoric artifacts per unit was 26, and the maximum of historic was 12. One hundred eighty-three units yielded no historic artifacts; 129 yielded no prehistoric. Thirteen units yielded only fire-cracked rock. Please note that these counts do not necessarily

[illegible]



10

[illegible]



coincide with those presented later in the discussion under Stage III because the counts were made from rough sorting, not detailed analysis.

The counts were plotted on a map of the grid within respective collection units (see Figure 6). The counts on the right side of each collection unit refer to historic artifacts. The counts on the left side refer to prehistoric artifacts. The counts were then examined to discern artifact concentrations and to answer the questions posed in the preceding methodology chapter. To avoid duplicity the answers to Questions 1 and 2 have been combined. There was no clear indication of surface horizontal extent beyond one surface artifact density cluster. This cluster consisted of prehistoric artifacts located on a small rise just west of the ditch levee. Outside of this cluster, the artifact counts, prehistoric and historic, were random and very slight, averaging less than 0.2 artifacts per square meter. No temporal span was indicated. Because only one cluster was apparent, no different specialized activities or time periods are indicated.

### Test Excavation

The second purpose of Stage I was to determine if the site extends under the fill materials to the edge of Ditch 19. Therefore, subsurface excavations were used. A total of 31 test units, each 1 x 1 m, were excavated to test the site. The first 15 were placed between the project boundary and the existing levee. They were placed in three lines of five units which ran perpendicular to the levee. Placement of each line was dependent on the location of artifact concentrations. Using the results of the excavations of the 15 test units, decisions on location of the three trenches which would

run perpendicular through the levee were made. The levee was removed through use of a backhoe with a three ft wide bucket. Each trench was approximately 1.5 m in width, and the sides were graded at an angle to allow the excavators to work safely. The trenches cut completely through the levee fill. All excavated levee fill was placed on the remaining portions of the levee to avoid placement on the site. Five test units were excavated in each trench (Figure 9). From the edge of the Ditch 19 and in each trench, the units were placed linearly with the southeast corner of the units being at 0 m, 1 m, 6 m, 11 m, and 14 m. A thirty-first unit was placed at the highest point in the approximate center of the artifact concentration and was excavated to the water table. A one inch soil probe was inserted to 30-40 cm below the completed level to define the deposit. Each unit was excavated using the methods described in the following paragraph.

The 16 units excavated between the project boundary and levee were excavated in arbitrary 10 cm levels. The dirt was screened through  $\frac{1}{4}$  in mesh. Artifacts were removed from the screens, and each level's artifacts were bagged and catalogued separately. Excavation was terminated when two successive levels yielded no cultural materials, or when the water table was reached. Once a unit was completely excavated, a profile of the wall was drawn which outlined the soil strata. Each strata was described by soil texture, Munsell color(s), and artifact content. Because soil stratum were natural zones, artifact recovery from arbitrary levels did not coincide with that from the strata. However, intuitive observations of artifact density within stratum were made by the recorders. Soil samples were taken from each soil stratum and were sorted into two ziploc plastic bags of approximately 1,000 gm each. Soil samples from culturally bearing strata were sent for pollen and phytolith testing. The



Figure 9. View of Trench 3 showing excavation of units in progress.



15 units excavated under the levee were subject to the same procedures except that the soil in the upper 15 - 20 cm which was clearly levee fill was not screened because of the nature of its disturbance. It was checked for artifacts and was noted on the unit profile sketch.

### Test Excavation Results

There were three sets of five 1 x 1 m test units placed between the project boundary and the levee. Each set is discussed in the following text. Units A-E were excavated to test the concentration which was indicated during the artifact density study. An additional unit, Unit EE, was placed at the highest visible part of the rise, where the artifact concentration occurred in order to better define this concentration. Units F-J were placed north of the controlled surface collection and 243 m north of the dirt road. Units K-O were excavated between the previous five units, Units F-J, and the tree line approximately 479 m north of the dirt road. The Units F-O were placed across from the area indicated as site 23DU227 according to the sketch map by Iroquois Research Institute see (Figure 4).

Three backhoe trenches were excavated, and five 1 x 1 m test units were placed within each of the backhoe trenches (Figures 10 and 11). The first two backhoe trenches and corresponding test units were placed so as to coincide with site area on the eastern side of Ditch 19. The final backhoe trench and corresponding test units were placed to coincide with Units F-J and the possible artifact location noted above. The following text provides results of the excavation of all these units. Figure 12 graphically presents the soil strata profiles of site 23DU227 with location of individual test units within the

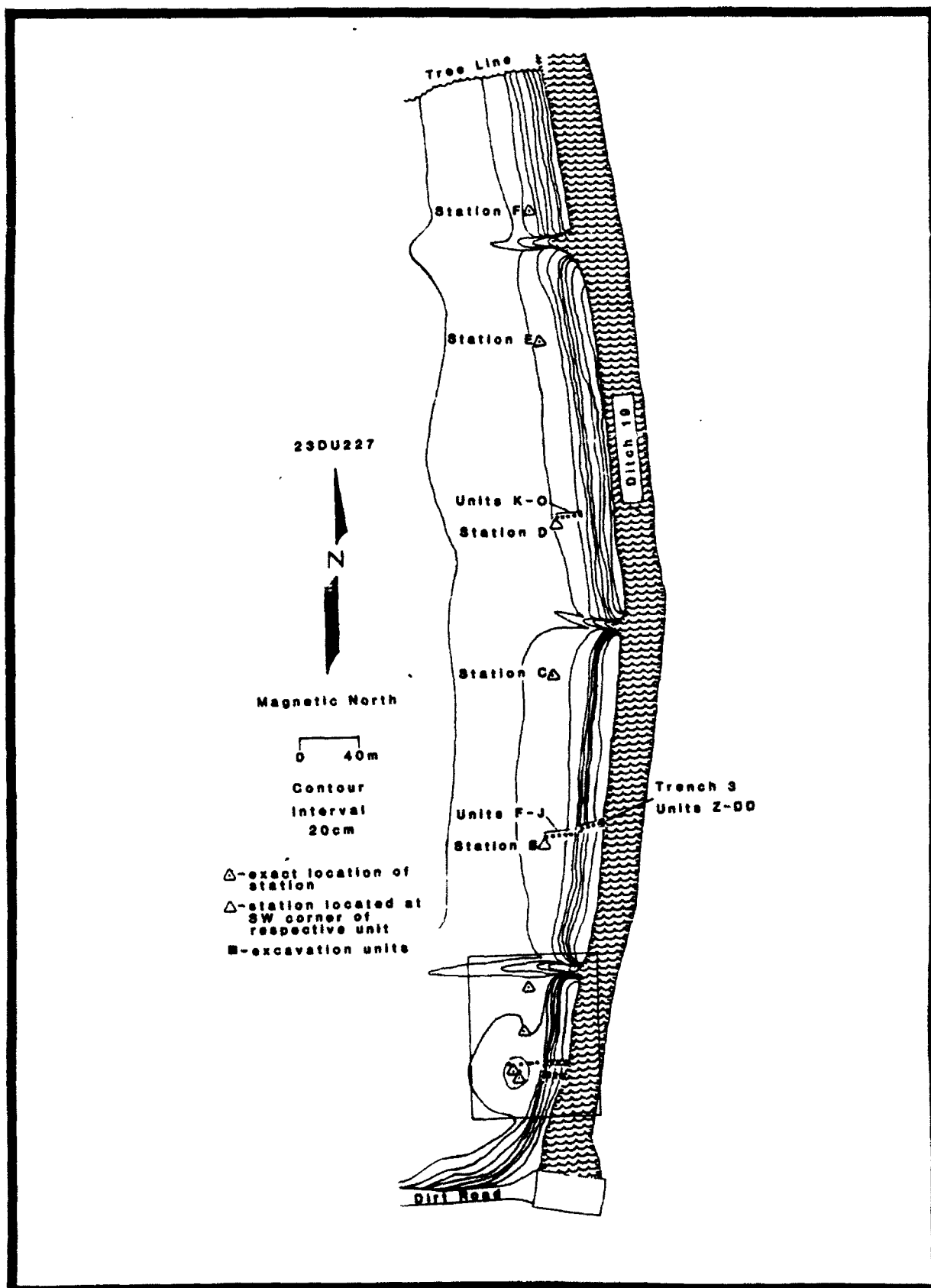


Figure 10. Map of site 23DU227 with areas of investigation indicated.

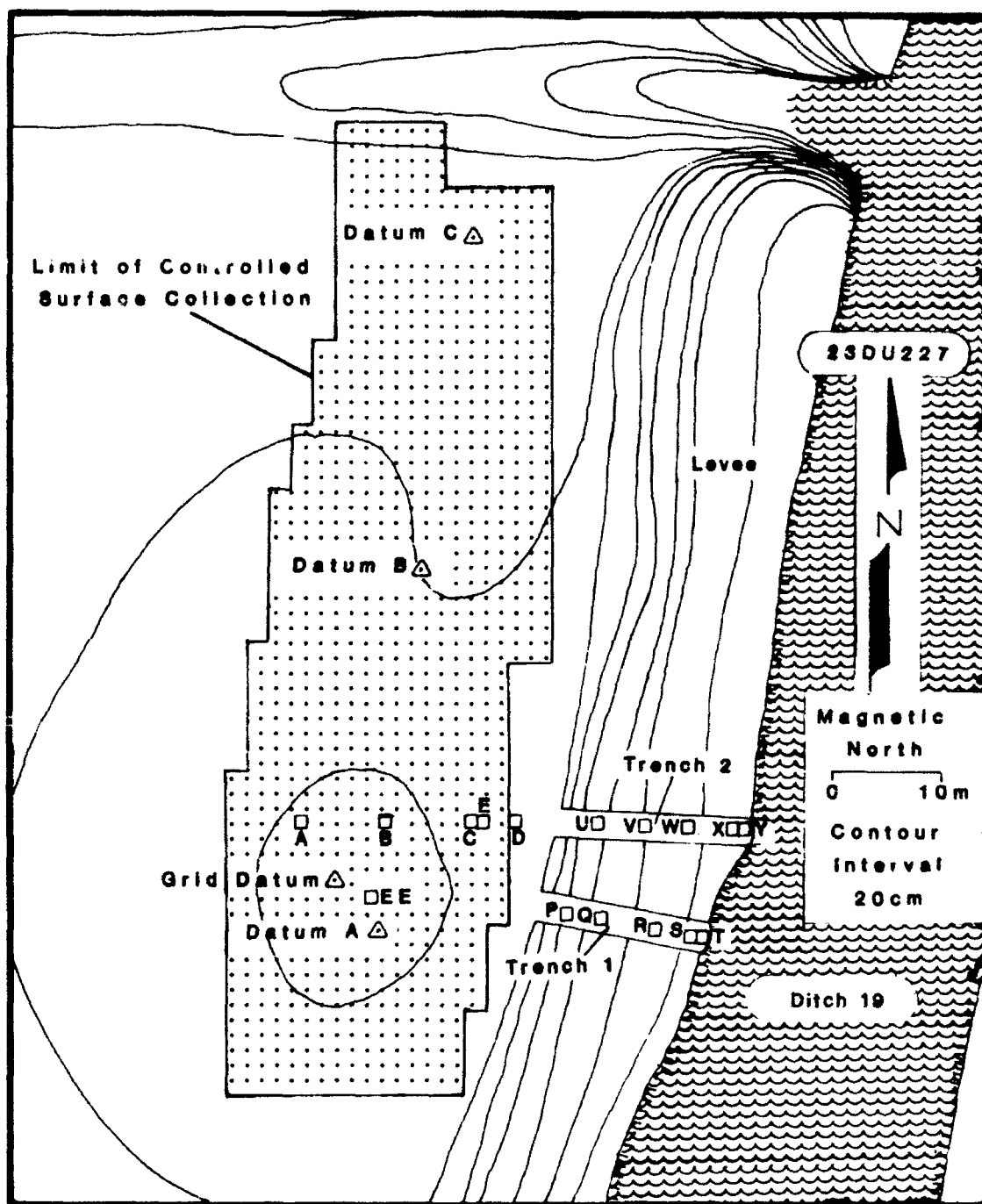


Figure 11. Map of site 23DU227 with areas of intensive investigation indicated.

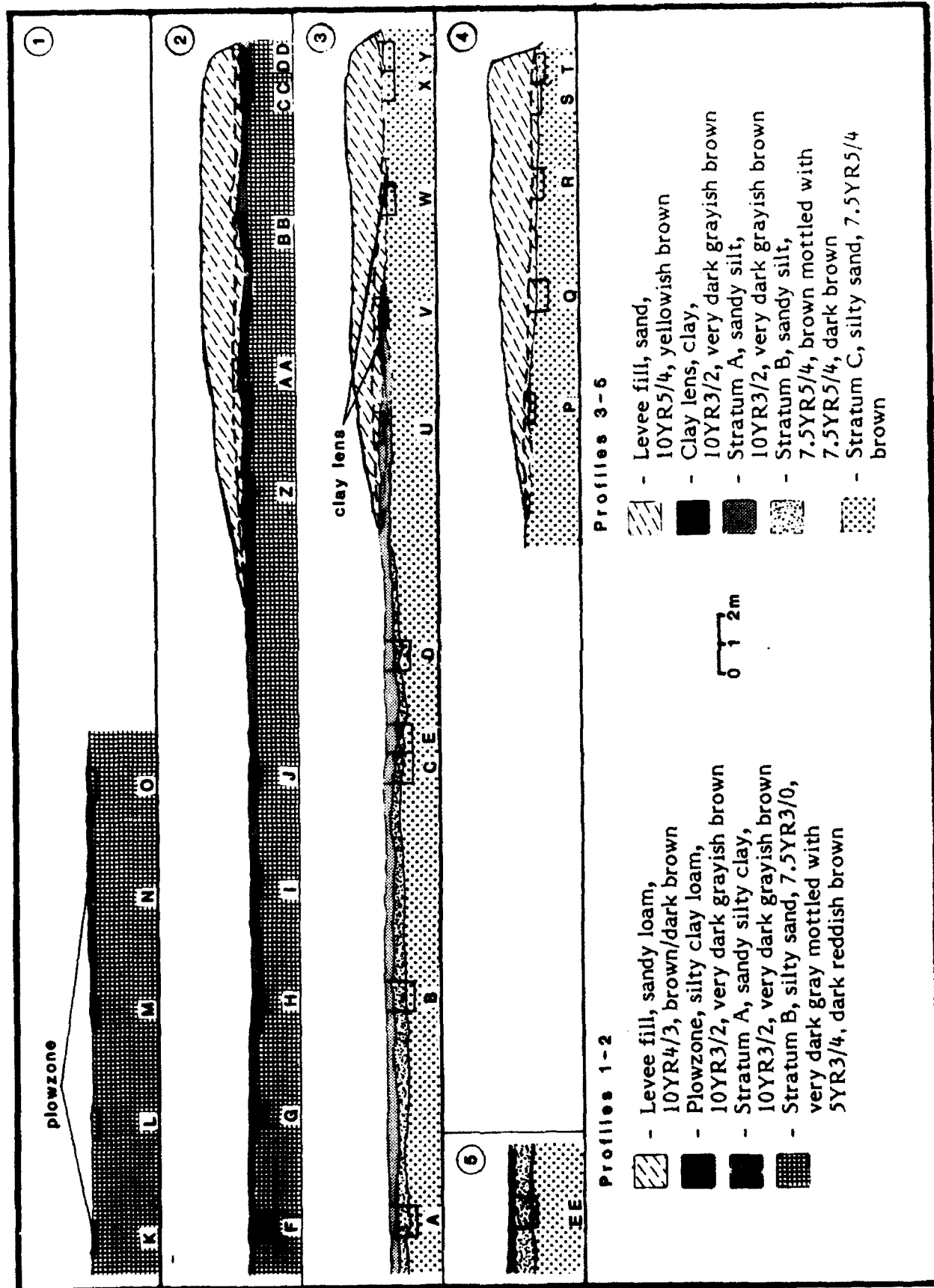
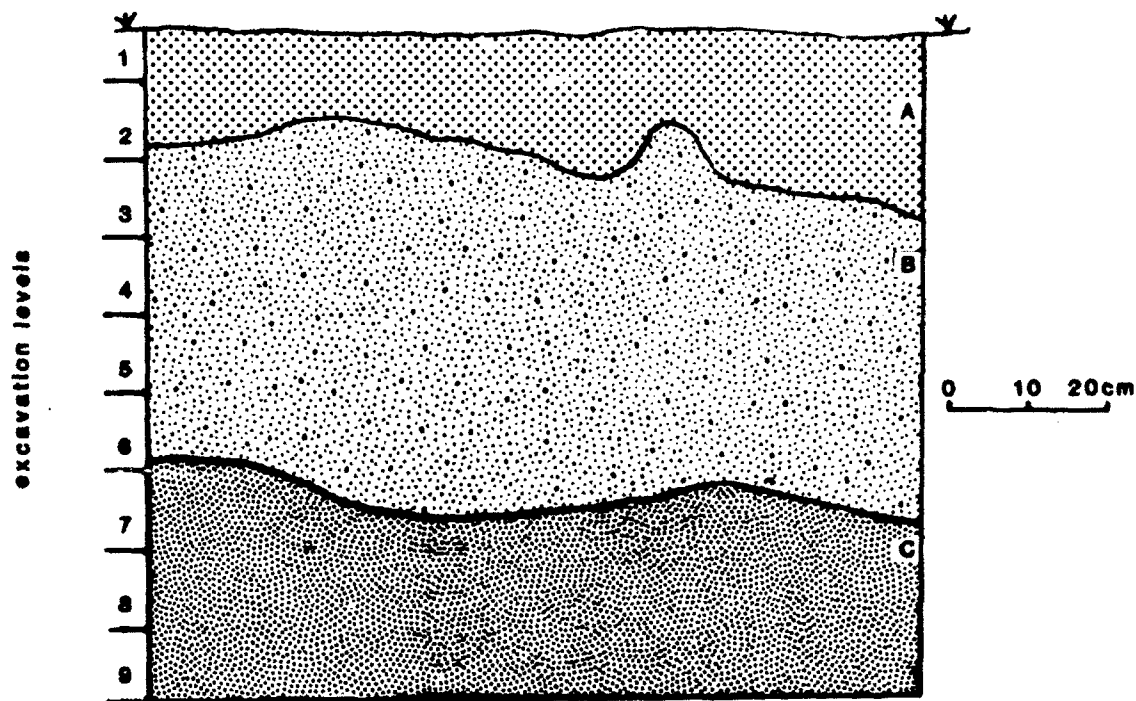


Figure 12. Soil strata profiles of 23DU227.

respective profile. As previously mentioned, the excavation of the units was in arbitrary 10 cm levels, but intuitive observations were made concerning artifact type and density within visible soil stratum. These observation are provided along with a table of artifacts by level per unit.

#### Unit A:

This unit (5N4W) consisted of three strata (Figure 13). Stratum A occurred from the surface to a depth of approximately 15 cm. The soil was a loosely compacted, sandy silt. Its associated Munsell color was 10YR3/4, dark, yellowish-brown. All artifacts recovered from this stratum were prehistoric artifacts. Stratum B occurred from 15 cm to 56 cm below the surface (bs). The soil was loosely compacted, sandy silt which was mottled in color. The associated Munsell colors ranged from 7.5YR5/4, brown, to 7.5YR3/4, dark brown. All artifacts recovered from this stratum were prehistoric lithic artifacts and included a projectile point base fragment. The number of artifacts in this stratum significantly exceeded the number recovered from other strata, possibly indicating a period of longer or more intensive occupation. Stratum C occurred from 56 cm to 87 cmbs. The soil of this stratum resembled that in the above strata in texture. Moisture significantly increased in this level, and the top of the water table was encountered, thus terminating excavation. Ferro-manganese concretions increased in this stratum. The associated Munsell color was 7.5YR5/4, brown. The number of artifacts recovered from this stratum significantly decreased. Table 2 provides a list of artifacts recovered from Unit A by level.



#### UNIT A

##### NORTH WALL PROFILE

- STRATUM A, SANDY SILT, 10YR3/4, DARK YELLOWISH BROWN
- STRATUM B, SANDY SILT, 7.5YR5/4, BROWN, TO 7.5YR3/4, DARK BROWN
- STRATUM C, SANDY SILT, 7.5YR5/4, BROWN

Figure 13.

Unit A, north wall profile.

Table 2. Prehistoric artifacts recovered from Unit A excavation

	Level									Total
	1	2	3	4	5	6	7	8	9	
Lithic										
Primary Flaking										
Bifaces								1		1
Marginally modified flake	1									1
Secondary Flaking										
Projectile point base				1						1
Debitage										
Interior	12	17	17	16		8	5	5	6	86
Secondary	3	3	1	1	1	1	1			11
Primary	5	5	4	2			1		1	18
Other										
Fire-cracked rock	14	12	20	25	5	8	3			87
Chunk/shatter	5	6	2	4	2	1	1	5	3	29
Ceramic										
Sand-tempered										
Barnes Cordmarked		1								1
Eroded	1	—	—	—	—	—	—	—	—	1
Total	41	44	44	49	8	18	11	11	10	236

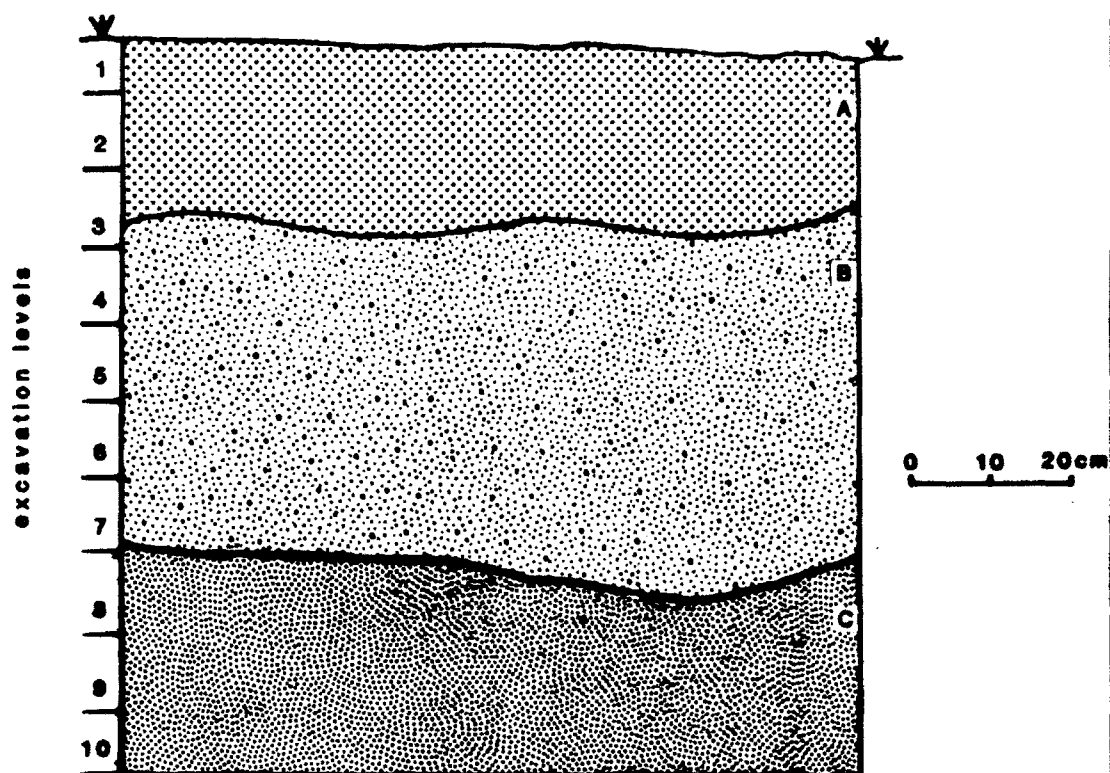
#### Unit B:

This unit (5N4E) consisted of three strata (Figure 14). Stratum A occurred from the surface to a depth of 25 cm. The soil was a moderately compact sandy silt. Its associated Munsell color was 7.5YR3/2, dark brown. Both historic and prehistoric artifacts were recovered from this stratum of the unit and occurred in moderate amounts. Stratum B occurred from 25 cm to 66 cmbs. The soil of this stratum was a loosely compacted, sandy silt which was mottled in color. The associated Munsell colors ranged from 7.5YR5/4, brown, to 7.5YR3/4, dark brown. Ferro-manganese concretions occurred in this stratum. All artifacts recovered from this stratum were prehistoric and include projectile points and ceramics. The number of artifacts shows a significant increase in this stratum. Stratum C occurred from 66 cm to 96 cmbs. The soil was a loosely compacted, sandy soil which was mottled in color. The associated Munsell color was 7.5YR5/4, brown mottled with 7.5YR3/4, dark brown. Ferro-manganese concretions increased in amount. The number of artifacts decreased significantly in this stratum. Table 3 provides a list of artifacts recovered from Unit B by level. The water table was encountered at the base of this unit, and excavation was terminated.

#### Unit C:

This unit (5N12E) consisted of three strata (Figure 15). Stratum A occurred from the surface to a depth of 27 cm. The soil was a loosely compacted, sandy loam. Its associated Munsell color was 10YR3/2, very dark grayish-brown. Artifacts recovered from this stratum include both prehistoric and historic artifacts. Stratum B occurred





#### UNIT B

##### NORTH WALL PROFILE

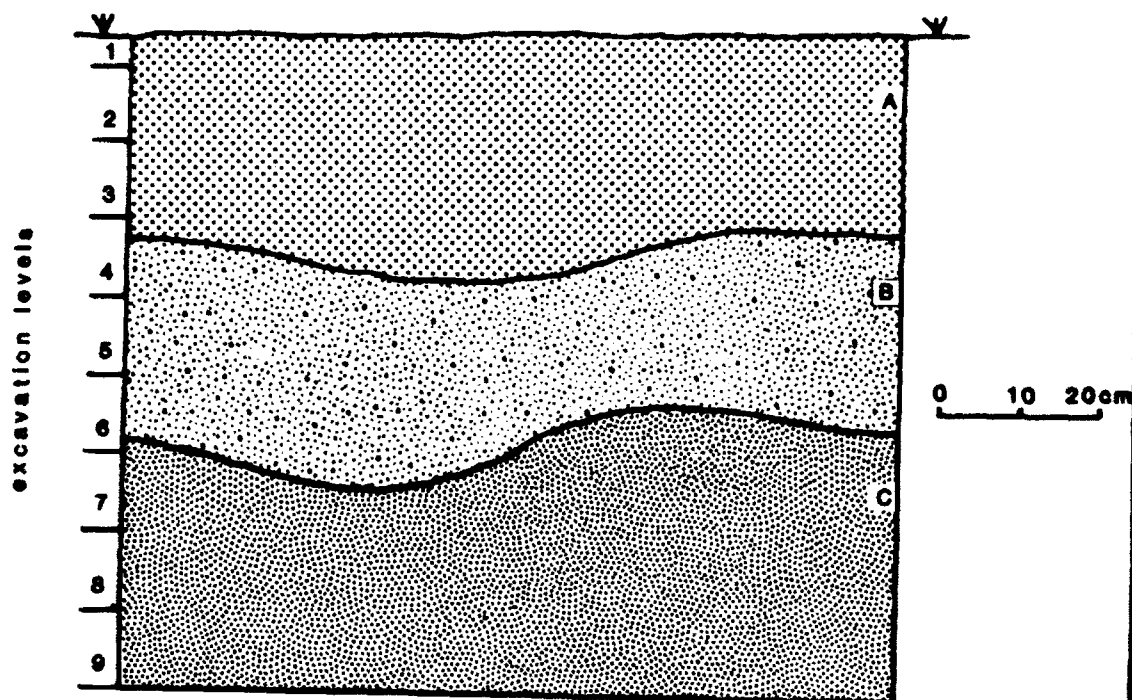
- STRATUM A, SANDY SILT, 7.5YR3/2, DARK BROWN
- STRATUM B, SANDY SILT, 7.5YR5/4, BROWN, TO 7.5YR3/4, DARK BROWN
- STRATUM C, SANDY SILT, 7.5YR5/4, BROWN, WITH 7.5YR3/4, DARK BROWN

Figure 14.

Unit B, north wall profile.

Table 3. Artifacts recovered from Unit B excavation

	Level										Total
	1	2	3	4	5	6	7	8	9	10	
Historic											
Glass											
Vessel											
Body	2	1									3
Base	1										1
Window Plate			1								1
Unidentified		1									1
Ceramic											
Colored paste stoneware	1										1
Brick	1										1
Metal											
Wire nail		1									1
Wire	1										1
Unidentified		2									2
Prehistoric											
Lithic											
Initial Production											
Core		2			4						6
Primary Flaking											
Biface									1		1
Uniface					1						1
Marginally modified flake	1										1
Secondary Flaking											
Projectile Point											
Gary			1								1
Indeterminate				1							1
Debitage											
Interior	33	32	31	33	14	11	21	3	4	5	187
Secondary	6	3	2	9	2			2			24
Primary	6	8	15	7	2	6	4	3	2	1	54
Other											
Fire-cracked rock	34	37	55	34	42	36	23	10	4	3	278
Chunk/shatter	1	8	21	24	22	16	6	7	10	3	118
Ceramic											
Sand-tempered											
Kenneth Plain					3	2	1				6
Barnes Cordmarked		1	3	4	3	6					17
Podal Support					1						1
Eroded		1	2	3	9	2					17
TOTAL	87	97	131	115	103	79	55	25	21	12	725



#### UNIT C

##### NORTH WALL PROFILE

- STRATUM A, SANDY LOAM, 10YR3/2, VERY DARK GRAYISH BROWN
- STRATUM B, SAND, 10YR5/3, BROWN, WITH 7.5YR4/4, BROWN/DARK BROWN
- STRATUM C, SAND, 7.5YR5/4, BROWN

Figure 15.

Unit C, north wall profile.

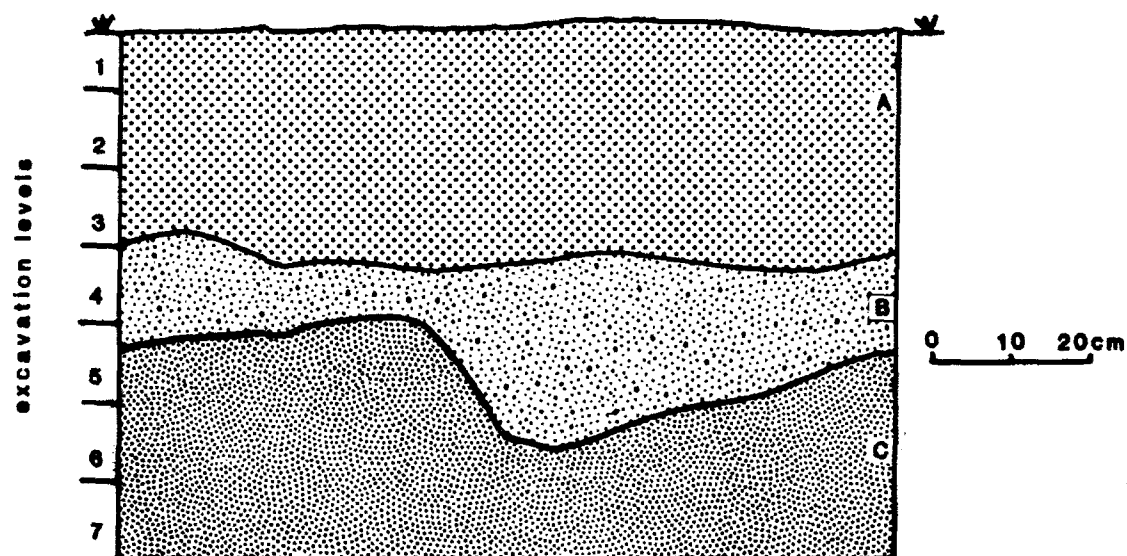
from 27 cmbs to 54 cmbs. The soil was a moderately compact, sandy soil which was mottled in color. The associated Munsell colors were 10YR5/3, brown, mottled with 7.5YR4/4, brown/dark brown. Artifacts recovered from this stratum include prehistoric lithic artifacts which increased in number from the above stratum and one prehistoric ceramic podal support. Stratum C occurred from 54 cmbs to 84 cmbs. The soil was a moderately compacted sandy soil with ferro-manganese concretions. Its associated Munsell color was 7.5YR5/4, brown. All artifacts recovered were prehistoric lithic artifacts, and their number decreased significantly as compared to both the above strata. Table 4 provides a list of artifacts from Unit C by arbitrary level.

#### Unit D:

This unit (5N16E) consisted of three strata (Figure 16). Stratum A occurred from the surface to a depth of 27 cmbs. The soil was a loosely compacted sandy silt. Its associated Munsell color was 7.5YR3/2, dark brown. Both historic and prehistoric artifacts were recovered from this stratum. Stratum B occurred from 27 cmbs to 41 cmbs. The soil was a loosely compacted, silty sand with a few small ferro-manganese concretions. Its associated Munsell color was 7.5YR4/2, brown/dark brown. All artifacts recovered were prehistoric lithic artifacts. The number of artifacts in the stratum only slightly exceeded that of the above stratum. Stratum C occurred from 41 cmbs to the base of the unit at 68 cmbs. The soil was a very moist, moderately compact silty sand with considerable ferro-manganese concretions. Its associated Munsell color was 7.5YR5/2, brown. Artifacts recovered from this stratum were limited to prehistoric lithic artifacts. Table 5 provides a list of artifacts recovered from Unit D by level.

Table 4. Artifacts recovered from Unit C excavation

	Level									Total
	1	2	3	4	5	6	7	8	9	
Historic										
Glass										
Vessel-body			1							1
Prehistoric										
Lithic										
Primary Flaking										
Marginally modified flake			1							1
Secondary Flaking										
Biface									1	1
Debitage										
Interior	4	12	32	10	16	19	25	12	16	146
Secondary	2	3	2	1	4	4	2	5		23
Primary		4	10	3	5	4	1	4	1	32
Other										
Fire-cracked rock	1	8	27	8	10	4	8	17	9	92
Chunk/shatter		2				2		1		5
Ceramic										
Sand-tempered										
Eroded	—	—	1	—	—	—	—	—	—	1
Total	7	29	74	22	35	33	36	39	27	302



#### UNIT D

##### NORTH WALL PROFILE

- STRATUM A, SANDY SILT, 7.5YR3/2, DARK BROWN
- STRATUM B, SILTY SAND, 7.5YR4/2, BROWN/DARK BROWN
- STRATUM C, SILTY SAND, 7.5YR5/2, BROWN

Figure 16.

Unit D, north wall profile.

Table 5. Artifacts recovered from Unit D excavation

	Level						Total
	1	2	3	4	5	6	
Historic							
Glass							
Vessel-body	4						4
Unidentified							
White milk glass	1						1
Metal							
Wire fragments	6						6
Prehistoric							
Lithic							
Initial reduction							
Cores					1		1
Debitage							
Interior		3	4				7
Secondary	1		1				2
Primary	3						3
Other							
Fire-cracked rock			1		2		3
Chunk/shatter			1			1	2
Ceramic							
Shell-tempered							
Eroded	—	$\frac{1}{1}$	—	—	—	—	$\frac{1}{1}$
TOTAL	15	4	7	0	3	1	30

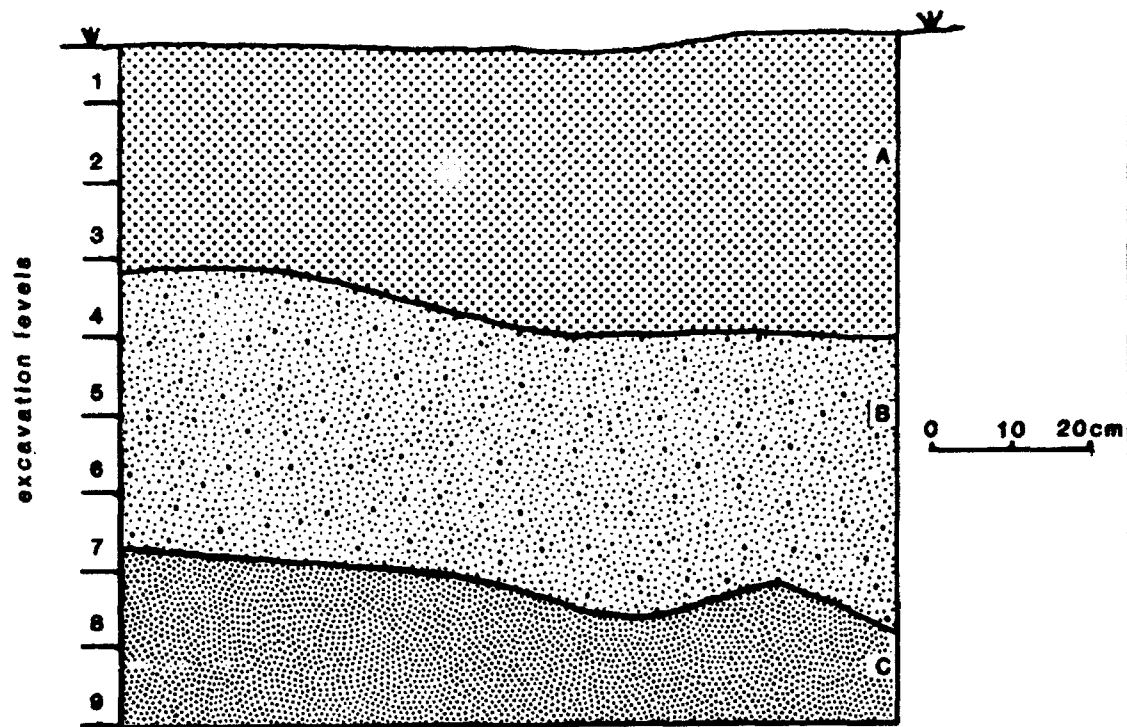
#### Unit E:

This unit (5N13E) consisted of three strata (Figure 17). Stratum A occurred from the surface to a depth of 29 cm. The soil was a loosely compact, sandy silt. Its associated Munsell color was 7.5YR3/2, dark brown. All artifacts recovered from this stratum were prehistoric lithic artifacts. Stratum B occurred from 29 cmbs to 65 cmbs. The soil was a damp, loosely compact, sandy soil with small ferro-manganese concretions. Its associated Munsell color was 7.5YR4/2, brown/dark brown. All artifacts recovered were prehistoric lithic artifacts. The number of artifacts increased over the number recovered from the above stratum. Stratum C occurred from 65 cm to the base of the unit at 88 cmbs. The soil was a very moist, silty sand with ferro-manganese concretions increasing in size and number. Its associated Munsell color was 7.5YR3/2, dark brown. All artifacts recovered were prehistoric lithic artifacts. The number of artifacts recovered was significantly less than the above strata. Table 6 provides a list of artifacts recovered from Unit E by level.

#### Unit F - Unit O:

These units shared the same basic characteristics (Figures 18, 19, and 20). Stratum A occurred in all of these units and existed from the surface to the base of the units (approximately 20 cmbs) in all but three of units, Unit F, Unit H, and Unit I where a small portion of Stratum B was encountered (Figures 18 and 19). Therefore, the profile for Unit also represents that for Units J and L. A plowzone was uncovered in three of these units (Units M, N, and O) and consisted of turned under organic matter and Stratum A soil. The profile for Unit O also represents that for Units M and N. A tree stain was recorded at the base of Unit K (Figure 20).





#### UNIT E

##### NORTH WALL PROFILE

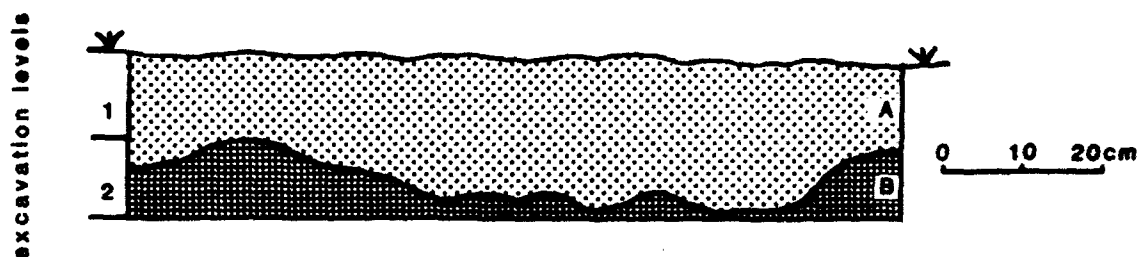
- STRATUM A, SANDY SILT, 7.5YR3/2, DARK BROWN
- STRATUM B, SAND, 7.5YR4/2, BROWN/DARK BROWN
- STRATUM C, SAND, 7.5YR3/2, DARK BROWN

Figure 17.

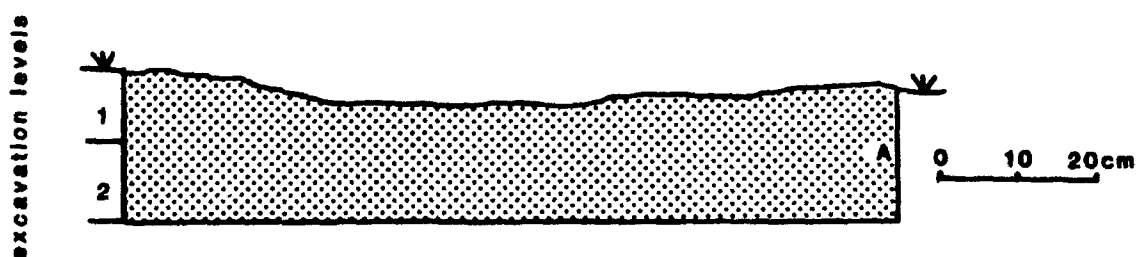
Unit E, north wall profile.

Table 6. Artifacts recovered from Unit E excavation

	Level									Total
	1	2	3	4	5	6	7	8	9	
Historic										
Ceramic										
Stoneware										
Colored paste	1									1
Glass										
Vessel-body		1								1
Metal										
Wire fragments	1									1
Unidentified fragments	1	1	7							9
Prehistoric										
Lithic										
Initial reduction										
Cores	1			1						2
Secondary flaking										
Biface fragment				1						1
Debitage										
Interior	1	1	8	12	5	5	11	12	10	65
Secondary	1		5	2		2	3	1	2	16
Primary	2	2	4	4	2	6	7	3	1	31
Other										
Fire-cracked rock	7		9	7	2	1	2	1	3	32
Chunk/shatter	—	—	<u>1</u>	<u>1</u>	—	—	<u>1</u>	<u>2</u>	<u>5</u>	<u>10</u>
Total	15	5	34	28	9	14	24	19	21	169

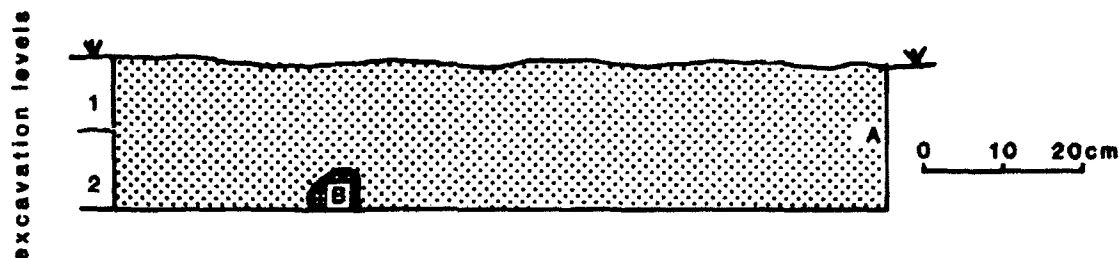


- UNIT F  
NORTH WALL PROFILE
- STRATUM A, SANDY SILTY CLAY, 10YR3/2, VERY DARK, GRAYISH-BROWN
  - STRATUM B, SILTY SAND, 7.5YR3/0, VERY DARK GRAY WITH 5YR3/4, DARK, REDDISH-BROWN



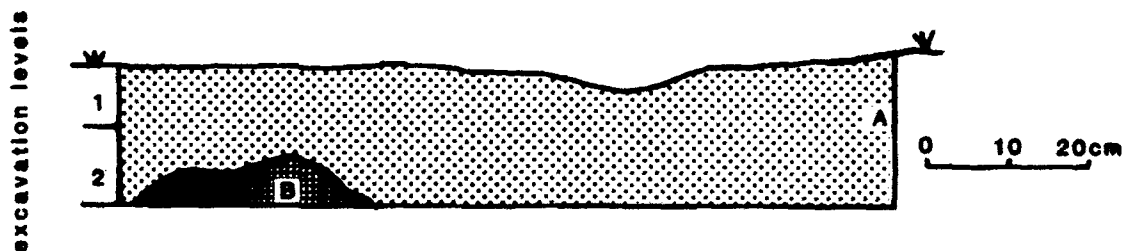
- UNIT G  
NORTH WALL PROFILE
- STRATUM A, SANDY SILTY CLAY, 10YR3/2, VERY DARK, GRAYISH BROWN

Figure 18. North wall profiles of Units F and G.



UNIT H  
NORTH WALL PROFILE

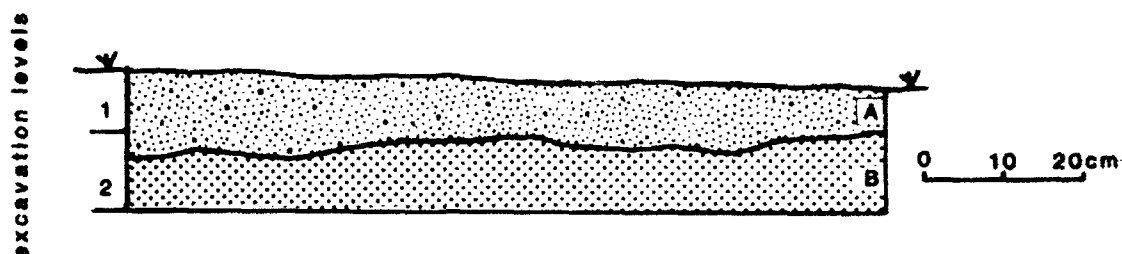
- STRATUM A, SANDY SILTY CLAY, 10YR3/2, VERY DARK GRAYISH BROWN
- STRATUM B, SILTY SAND, 7.5YR3.0, VERY DARK GRAY WITH 5YR3/4, DARK, REDDISH-BROWN



UNIT I  
NORTH WALL PROFILE

- STRATUM A, SANDY SILTY CLAY, 10YR3/2, VERY DARK, GRAYISH BROWN
- STRATUM B, SILTY SAND, 7.5YR3/0, VERY DARK GRAY, WITH 5YR3/4, DARK, REDDISH-BROWN

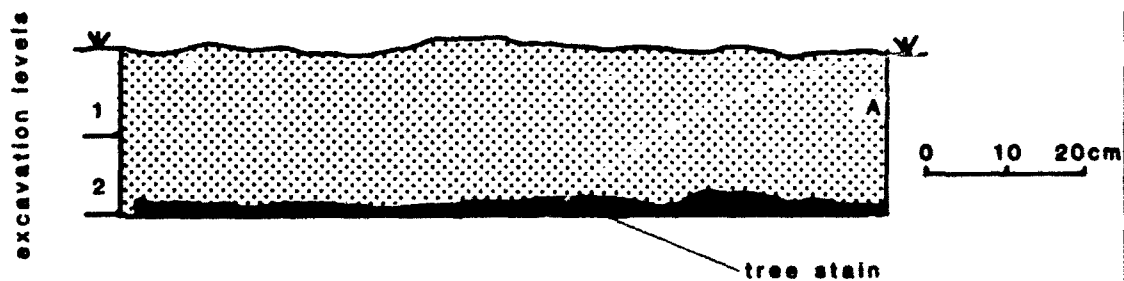
Figure 19. North wall profiles of Units H and I.



#### UNIT O

##### NORTH WALL PROFILE

- PLOWZONE, LOAM, 10YR3/3, DARK BROWN
- STRATUM A, SANDY SILTY CLAY, 10YR3/2, VERY DARK GRAYISH BROWN



#### UNIT K

##### NORTH WALL PROFILE

- STRATUM A, SANDY SILTY CLAY, 10YR3/2, VERY DARK, GRAYISH BROWN
- TREE STAIN, SAND, 10YR4/4, DARK YELLOWISH BROWN

Figure 20. North wall profiles of Units O and K.

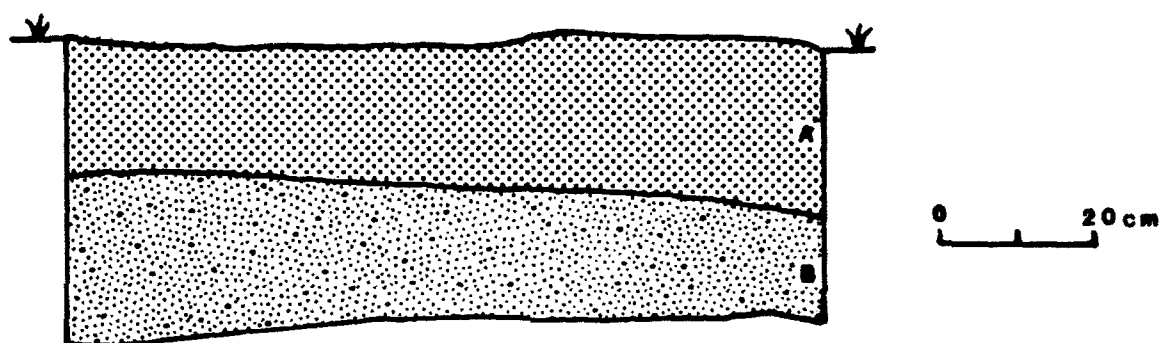
The soil of Stratum A was a compact, sandy silty clay. Its associated Munsell color was 10YR3/2, very dark, grayish-brown. Artifacts recovered from Units F through O total: three pieces of fire-cracked rock from Unit O; one metal wire fragment from Unit M; and one flake from Unit G (Table 7). All of these artifacts were recovered from the first 10 cm excavation level of their respective units. Stratum B occurred in three units; Unit F, Unit H, and Unit I. In Unit F this stratum occurred from 16 cmbs to the base of the unit at 23 cmbs. In Unit H, this stratum occurred as a small intrusion at the base of the north wall. In Unit I, this stratum occurred as a pocket whose dimensions ran 35 cm along the base of the north wall, with a maximum depth of 8 cm, and was partially evident in the floor of the unit. The soil of this stratum was a very compact, silty sand which was mottled in color. Its associated Munsell colors were 7.5YR3/0, very dark gray, and 5YR3/4, dark, reddish-brown. No artifacts were recovered from this stratum in either of these units.

Unit P through Unit U, Unit X, and Unit Y:

These units shared the same basic characteristics and were placed in the floor of two backhoe trenches. The profile for Unit P generally represents that of the other profiles (Figure 21). Stratum A soil for these units was a loosely compacted sand. This soil was brought in for construction of the levee adjacent to Ditch 19. Its associated Munsell color was 10YR5/4, yellowish-brown. Unit P and Unit Q were the only units to yield artifacts from this stratum (Table 7). Artifacts recovered included one prehistoric ceramic sherd and several pieces of prehistoric lithic debris. Underlying this levee fill, Stratum B occurred. This stratum corresponded with Stratum C of Unit A through Unit E. The soil here was more compact and had a higher clay content. Its associated Munsell color ranged from 7.5YR3/2, brown, to 10YR3/2, very dark, grayish-brown. No artifacts were recovered from this stratum.

Table 7. Artifacts recovered from excavation of Units G-Z

	Unit G Level <u>1</u>	Unit O Level <u>1</u>	Level <u>2</u>	Unit M Level <u>1</u>	Level <u>2</u>	Unit P Level <u>2</u>	Unit Q Level <u>3</u>	Level <u>4</u>	Unit Z Level <u>2</u>
Historic									
Metal									
Wire fragment				1					
Prehistoric									
Lithic									
Debitage									
Interior	1				2		2		
Secondary							1		
Primary									1
Other									
Fire-cracked rock		2	1		2			2	1
Chunk/shatter							2	1	
Ceramic									
Sand-tempered									
Eroded	-	-	-	-	-	<u>1</u>	-	-	-
TOTAL	1	2	1	1	4	1	5	3	2



UNIT P  
NORTH WALL PROFILE  
- STRATUM A, SAND 10YR5/4,  
YELLOWISH BROWN  
- STRATUM B, SANDY CLAY, 7.5YR3/2  
TO 10YR3/2, BROWN TO VERY DARK  
GRAYISH-BROWN

Figure 21. North wall profile of Unit P.

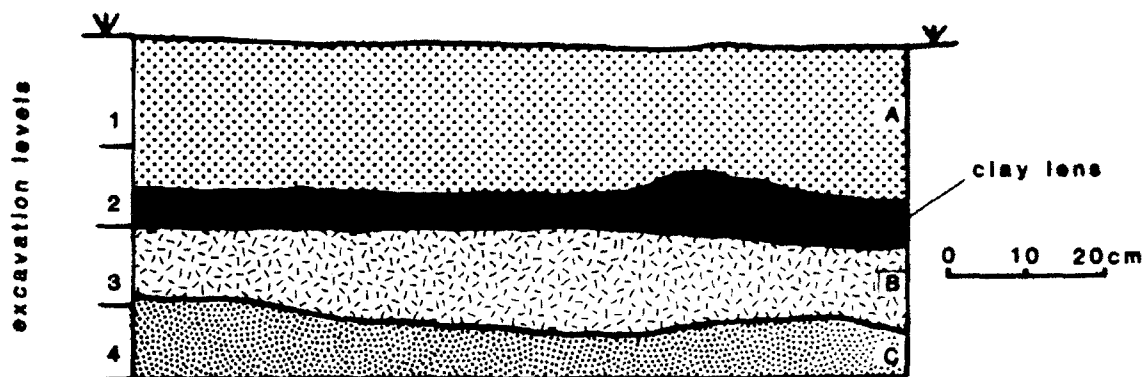


#### Unit V and Unit W:

Although placed within the same backhoe trench as Units U and Y, these units yielded slightly different stratum information (see Figures 12 and 22). Stratum A for these units was levee fill and corresponded with the description given above. Underlying the levee fill a clay lens was encountered in these two units, possibly a clay lining which levee fill sand was placed over. In Units V and W, underlying the clay lens, a stratum occurred which corresponded with Stratum A of Units A - E. This soil was more compact and had a higher clay content than that of Stratum A in Units A - E. Its texture remained sandy, however. Its associated Munsell color was 10YR3/2, dark, grayish-brown. A fourth stratum was encountered underlying the previously mentioned strata. This stratum corresponded to Stratum C in Units A - E. Again the Stratum C soil in these two units was more compact and contained a higher clay content than Stratum C soil in Units A - E. Its associated Munsell colors were 10YR3/3, dark brown. No artifacts were recovered from any of the strata of these two units.

#### Unit Z through Unit DD:

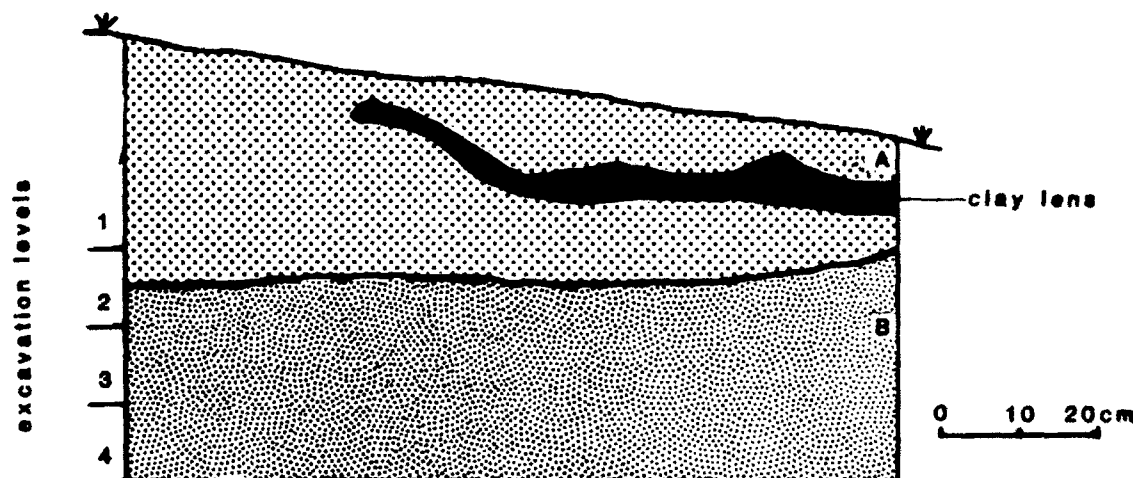
These units (see Figure 12) share the same basic characteristics. Stratum A for these units was levee fill. The soil was described as a moderately compact, very sandy loam. Its associated Munsell color was 10YR4/3, brown/dark brown. No artifacts were recovered from this stratum in any of these units. Underlying this stratum was a soil that corresponds to Stratum A of Units F-J (Figure 23). The soil of this stratum was a compact, sandy silty clay. Its associated Munsell color was 10YR3/2, very dark, grayish-brown. No artifacts were recovered in this stratum in any of these units.



#### UNIT V

##### NORTH WALL PROFILE

- STRATUM A, SAND, 10YR5/4, YELLOWISH BROWN
- CLAY LENS, CLAY, 10YR3/1, VERY DARK GRAY
- STRATUM B, CLAYEY SANDY SILT, 10YR3/2, VERY DARK GRAYISH BROWN
- STRATUM C, CLAYEY SANDY SILT, 10YR3/3, DARK BROWN



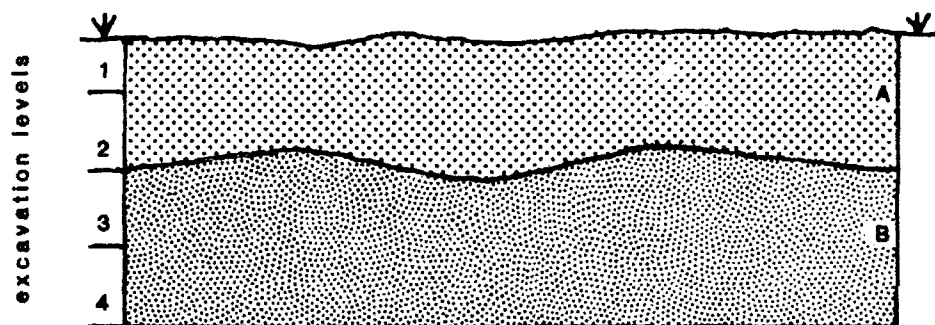
#### UNIT W

##### NORTH WALL PROFILE

- STRATUM A, SAND, 10YR5/4, YELLOWISH BROWN
- CLAY LENS, CLAY, 10YR3/1, VERY DARK GRAY
- STRATUM B, CLAYEY SANDY SILT, 10YR3/3, DARK BROWN

Figure 22.

North wall profiles of Units V and W.



#### UNIT Z

##### NORTH WALL PROFILE

- STRATUM A, SANDY LOAM, 10YR4/3, BROWN/DARK BROWN
- STRATUM B, SANDY-SILTY CLAY, 10YR3/2, VERY DARK GRAYISH BROWN

0 10 20cm

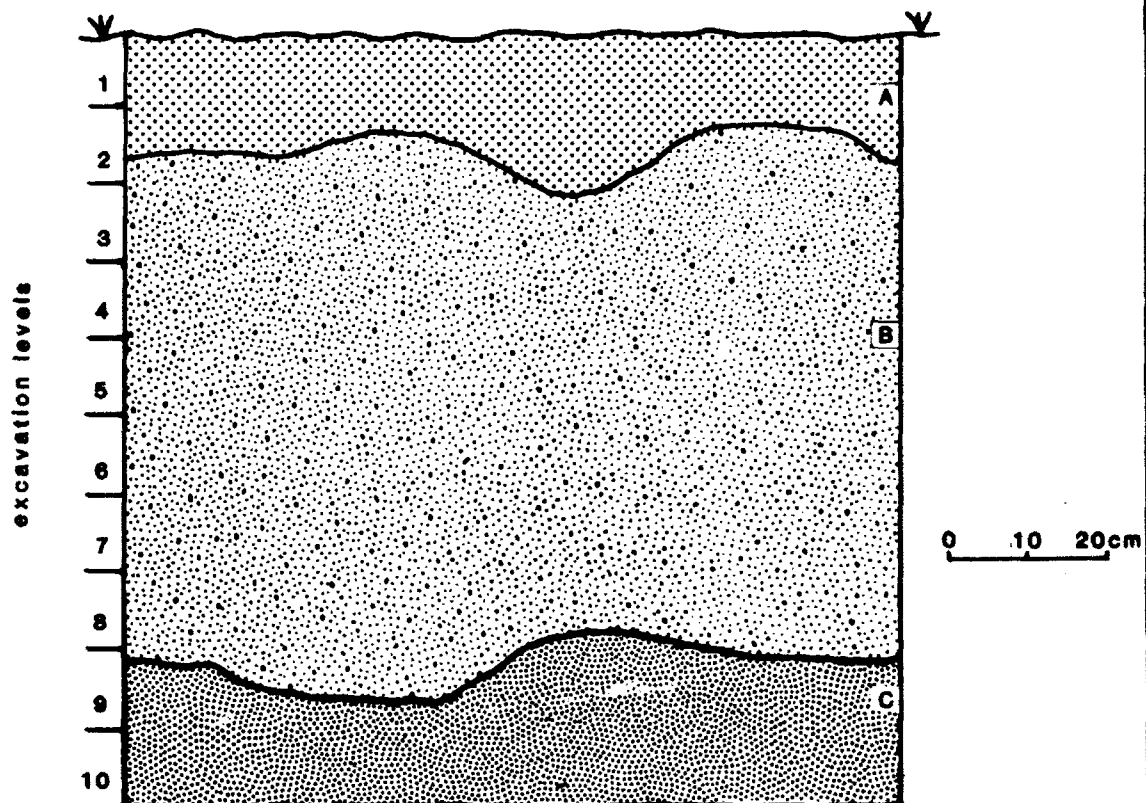
Figure 23.

Unit Z, north wall profile.

#### Unit EE:

This unit (1S3E) consists of three strata (Figure 24). Stratum A occurred from the surface to a depth of 16 cmbs. The soil was a loosely compact, sandy loam. Its associated Munsell color was 10YR3/4, dark, yellowish-brown. Artifacts recovered from this stratum included historic glass, metal and ceramics, and prehistoric lithic and ceramic artifacts. Stratum B occurred from 16 cmbs to 81 cmbs. The soil of this stratum was a loosely compact, sandy loam which was mottled in color. Its associated Munsell colors were 10YR2/2, very dark brown mottled with 10YR4/3, brown/dark brown. Ferro-manganese concretions occurred in this stratum in slight amounts, increasing at the base of the stratum. Artifacts from this stratum exceeded the other strata in this unit in number and included projectile points, biface fragments, a core, and other lithic debris. Prehistoric ceramics were recovered from this stratum as well. No historic artifacts were recovered. Stratum C occurred from 81 cm to the base of the unit at 100 cmbs. The soil was described as a sandy soil with numerous ferro-manganese concretions. Its associated Munsell color was 10YR4/4-5/4, yellowish-brown/dark, yellowish-brown. A 50% decrease in the number of artifacts, as compared with Stratum B, was noted for this stratum. Artifacts recovered included prehistoric lithic and ceramic artifacts. Table 8 provides a list of artifacts recovered from the arbitrary levels of this unit. The water table was encountered at the base of this unit, thus terminating excavation. The strata of this unit corresponded with those in Units A - E (see Figure 12).

Once Stage I investigations were completed, a field interim report was submitted. This report provided a brief description of methods used and preliminary results of the investigation.



#### UNIT EE

##### NORTH WALL PROFILE

- STRATUM A, SANDY LOAM, 10YR3/4, DARK YELLOWISH BROWN
- STRATUM B, SANDY LOAM, 10YR2/2, VERY DARK BROWN, WITH 10YR4/3, BROWN/DARK BROWN
- STRATUM C, SAND, 10YR4/4/5/4, YELLOWISH BROWN/DARK YELLOWISH BROWN

Figure 24.

Unit EE, north wall profile.

Table 8. Artifacts recovered from Unit EE excavation

	Level										Total
	1	2	3	4	5	6	7	8	9	10	
Historic											
Ceramic											
Stoneware											
White paste	1										1
Colored paste	2										2
Vessel											
Lip/neck											
Machine molded	1										1
Body											
Unmarked	10	5									15
Base											
Unmarked	1										1
Metal											
Wire nail		1									1
Wire fragments	1	1									2
Unidentified fragment	10	8									18
Total Historic	26	15									41
Prehistoric											
Lithic											
Initial reduction											
Core			1						1		2
Primary flaking											
Biface			1	1	2	1			1	1	7
Uniface							1				1
Secondary flaking											
Projectile point											
Big Sandy								1			1
Fragment		1									1
Debitage											
Interior	53	50	30	18	23	7	14	16	8		219
Secondary	13	9	1	4	4	5	1	2	1		40
Primary	4	12	14	14	16	4	1	2	1		68
Other											
Fire-cracked rock	51	50	24	20	83	39	65	51	53	1	437
Chunk/shatter	18	17	13	31	45	6	19	15	26	10	200
Ceramic											
Shell-tempered											
Neelys Ferry Plain	3										3
Eroded			3	4							7
Sand-tempered											
Kenneth Plain	4		1	2							7
Barnes Cordmarked		3	10	13	4	1	2		4		37
Fingernail marked			1	1							2
Eroded		2	3	13	8	1	4		3		34
TOTAL PREHISTORIC	146	144	102	121	185	64	107	87	98	12	1066

### STAGE III. ANALYSIS

This stage was related directly and explicitly to the research design. The philosophy behind the laboratory procedures that was used on the Dunklin County Ditch 19 project was that of an aggressive field laboratory as defined and described by Nichols and Evans (1979). This type of field laboratory is defined as "an on-site locus of information processing, where all excavated materials are classified and coded for computerized data storage and retrieval, undergo conservation if necessary, and are measured, weighed, and packaged in an orderly and meaningful fashion" (Nichols and Evans 1979:325). The authors make four suggestions for maintaining an aggressive field laboratory.

- 1) The field laboratory should be able to process and analyze information.
- 2) The field laboratory director's position should be equal to that of field director. The laboratory director should be able to manage all aspects of laboratory processing and analysis. The laboratory director should coordinate laboratory activities and information with the field for maximum, efficient use of time. (However, because crew size is small, the director for field and laboratory was the same, and was qualified for direction of both.)
- 3) The laboratory work should be conducted concurrently with fieldwork.
- 4) The field laboratory should be able to aid in integrating the research design with fieldwork through a constant feedback system (Nichols and Evans 1979:325-326).

Every attempt was made to follow the above guidelines to maximize the recovery and analysis of information. However, because of the paucity of materials, computer coding was not performed. The preceding suggestions have been integrated into the following methodology presented in two parts: processing and analysis. Each analysis section is followed by results of its undertaking.

### Processing

A field laboratory was set up in the vicinity of the project area. This laboratory was set up with work tables, lights, scales, artifact description sources and other relevant literature, and other supplies.

Every bag, whether it contained artifacts or soil, was logged by the field crew at the end of each work day; all bags and bag logs were then checked into the laboratory. These were quickly checked for presence and accuracy. A laboratory log was then prepared which listed each bag, provenience when applicable, and provided an accounting of every major task that was performed on each sample, e.g., washing, analyzing, etc. These were checked upon completion of each task with date completed.

Processing the artifacts and samples involved washing, sorting, and labeling. Washing was done in the field laboratory in the method most suited to the artifacts being cleaned. Lithic materials and historic artifacts (excluding metal) were cleaned with water and vegetable brushes or toothbrushes. Special attention was paid to lithic tools and the broken edges of prehistoric ceramics. Edges of prehistoric ceramics were cleaned with wet brushes to reveal tempering agents, and surfaces were gently rubbed



with fingertips or soft brushes to preserve surface treatment. Metal pieces were dry brushed.

Sorting and analysis were performed simultaneously. Once analysis of each sample was completed, the artifacts were labeled with a catalog number consisting of the site number and provenience in indelible ink and sealed with a clear matte, and then placed in bags labeled with the catalog number, provenience data, analytical category, raw material, count, and weight. The only artifacts not labeled were fire-cracked rock chunk/shatter, rusted metal pieces, mussel shell, and artifacts too small to label. These were placed into properly labeled containers. Diagnostic artifacts were labeled with unique artifact numbers consisting of a numerical digit placed after the unit catalog number. This facilitates their retrieval and identification for further, and future, analysis and reference. These numbers were recorded also, along with all other analytical data, on the field specimen forms for each catalog number.

### Analysis

The analysis had been structured to provide information which could effectively deal with the research design in relation to the material recovered.

### Artifact Assemblage

There were a total of 4,960 artifacts recovered from surface collection and excavation of 23DU227. Appendix D presents gross counts of each artifact category and a general provenience of each category. There are 2,318 prehistoric lithic artifacts, 179

prehistoric ceramic sherds, 51 historic ceramic sherds, 352 historic glass fragments, 150 historic metal pieces, 10 pieces of miscellaneous materials (e.g., plastic), 1,442 pieces of fire-cracked rock, 466 pieces of chunk/shatter, and 1 piece of fired clay. Analysis of artifacts recovered from the controlled surface collection recorded a total of 2,231 artifacts; 896 of these artifacts were contained in the rise area. The artifacts recovered from the rise area include 17 prehistoric modified lithics, 454 pieces of debitage, 273 pieces of fire-cracked rock, 11 pieces of prehistoric ceramics, 7 pieces of historic ceramics, 52 pieces of glass, 32 pieces of metal, and 1 piece of other material. The area of the rise was contained in approximately 81 (15.8%) of the 512 controlled surface collection units (see Figure 8), and 37.9% of all artifacts recovered from the 512 units were from the rise area. The excavation units yielded a total of 2,599 artifacts, and 1,716 of these artifacts were recovered from the three excavation units contained in the rise area. The artifacts recovered from these units include 26 pieces of chipped stone, 707 pieces of debitage, 806 pieces of fire-cracked rock, 133 prehistoric ceramic sherds, 3 historic ceramic sherds, 18 pieces of glass, 22 pieces of metal, and 1 piece of other materials. Sixty-six percent of all artifacts recovered from all of the excavation units were recovered from the three units contained in the rise area. It should be noted that while the rise area contained 15.8% of all controlled surface collection units, this area contained 42.6% of all prehistoric artifacts and only 19.3% of all historic artifacts recovered from the controlled surface collection.

All historic artifacts recovered from excavation units were contained in the first three excavation levels, i.e., from the surface to a depth of 30 cm. The prehistoric artifacts occur in relatively larger quantities in the first five levels with a 39% drop in the number of artifacts occurring between Levels 5 and 6. A Gary projectile point was

recovered from Level 3, and a Big Sandy projectile point was recovered from Level 8. The majority of the prehistoric ceramics, 80%, occur in the first five levels. However, the occurrence of sand-tempered ceramics in Level 9, Unit EE, underlying the Archaic associated Big Sandy projectile point, indicates a mixing of Archaic with later occupations. A mixing of historic artifacts with prehistoric artifacts occurred in the first three levels of the excavation units. This mixing can be attributed to land clearing and agricultural activities. The context of fire-cracked rock and chunk/shatter is uncertain in the surface collection because of agricultural practices, i.e., plowing and field burning. Therefore, there is a separate discussion of these categories. Each of the artifact categories is discussed in the following text.

#### Prehistoric Lithic Analysis and Results

Lithic materials have proven to be the most durable of all artifacts created by human hands. Additionally, these lithic artifacts reflect the adaptive patterns of their manufacturers. "It is imperative, therefore, that his analytical procedures be capable of extracting the maximum possible understanding of human behavior from the limited data" (Collins 1975:15). Collins further chides archaeologists by stating that they "have not developed a comprehensive framework suited to the integration of technological and typological analytical procedures, the explication of specific lithic technologies, and the examination of the adaptive role of lithic technology in the broader cultural context" (Collins 1975:15). The following methodology has been designed which structures and organizes the lithic analysis so that a "comprehensive framework" for "maximizing possible understanding of human behavior" was provided. To accomplish this, three fundamental aspects of this lithic analysis were developed which could meet the requirements of the research design:

- o lithic technology
- o functional/temporal assessment of tools
- o lithic resource exploitation patterns

### Lithic Technology Analysis

Lithic technological analysis on this project was based on the typological reductive system developed by the University of Kentucky Cultural Resource Assessment Program for the Southwest Jefferson County Floodwall Mitigation Project (Collins 1979:60-400). All worked lithics were fitted into this lithic reductive sequence which divides the processes of chipped stone manufacture and use into six stages. Each stage is recognized archaeologically by its end and by-products. These were placed into groups referred to as product groups by Collins (1975) and summarized by Bandy (1978:179-182). These stages, associated groups, and characteristic lithics (Figure 25) are adapted from Niquette (1983) and are as follows:

Acquisition of raw materials - Group 1 - selected but unaltered raw materials.

Initial reduction - Group 2 - cores, flakes, debris - the cores have been prepared and/or reduced.

Primary flaking - Group 3 - preforms, rejects, finished implements, and debitage - flake tools have been placed in this group if they have not been modified by more than bifacial thinning.

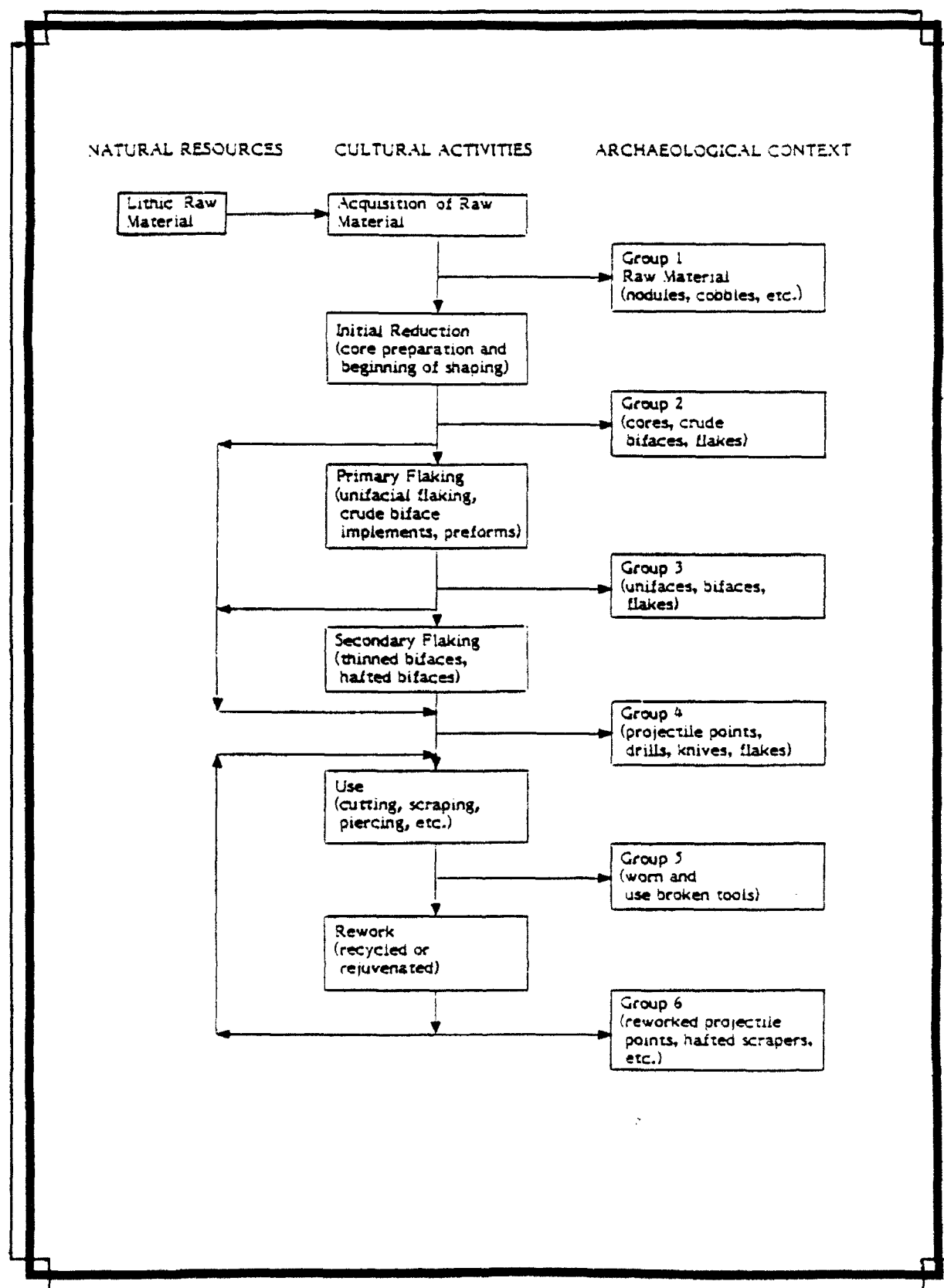


Figure 25. Schematic representation showing the relationship between cultural activities and product groups within the lithic technological system (Collins 1979:62).

Secondary flaking - Group 4 - finished implements, debitage, and rejects - results from secondard trimming and shaping.

Use - Group 5 - tools taken out of active use - according to Niquette (1982:7-3), Group 5 "contains used items and is not literally part of a reduction sequence." Group 5 was not distinguished because use-wear analysis was not an integral part of this analysis. This is not meant to imply artifacts were or were not used. Therefore, all tools remain in their previous group designation (2, 3, or 4).

Recycling - Group 6 - artifacts which have resharpened and/or modified. This group was not well represented, but this is a result of the analytical techniques for this study not being sophisticated enough to recognize attributes.

Once worked lithic artifacts were placed within the product groups, other characteristics were noted. When appropriate, the following observations were made of each complete chipped stone artifact: material type, cortex, presence of heat treatment evidence, weight, length, width, haft length, maximum haft width, minimum haft width, and breakage of any portion of the artifact. Minimally weight and raw material of each chipped stone artifact were recorded. Groundstone artifacts were not recovered. Descriptions of the various chipped stone categories are provided in Appendix B. All flakes were subjected to the following observations: material type, evidence of heat treatment, presence of cortex, count, and weight. Based on the presence of cortex, debitage was placed within lithic reduction groups. Primary flakes

are considered Group 2, secondary flakes are considered Group 3, and interior are lumped as Group 4, although it is realized that any may be by-products of the other groups. Definitions of various technical terms are included as Appendix C.

### Lithic Technology

Of the 2,318 prehistoric lithic artifacts, 2,316 are used for this technological analysis of lithic manufacture. Two chipped stone artifacts, a wedge and a serrated, stemmed projectile point, were recovered from the surface of the site on top of the levee but not within the controlled surface collection. Because these two artifacts represent a biased collection, they are not included in this discussion on lithic technology.

The 2,316 lithic artifacts were classified into Groups 2, 3, 4, 5, and 6. Group 1 involves the acquisition of lithic raw materials, and inferences regarding its participation within the lithic reduction sequences are drawn from results of the raw material analysis. Counts for Groups 2, 3, 4, and 6 represent discrete counts, whereas Group 5 is a subcategory of these other groups in that it represents those artifacts which have been used, and does consist of artifacts actually in the other groups.

Group 2 contains 379 artifacts, or 16.4% of the collection (Figure 26). Of these, 20 are cores, and the remainder is debitage. All of the Group 2 assemblage consists of Crowley's Ridge cherts and quartzite except for one flake. Cores represent 22.7% of the 88 chipped stone artifacts, and primary flakes represent 15.7% (Figure 27). The nearly equal percentages of Group 2 chipped stone and debitage indicates that initial core preparation was occurring at the site.

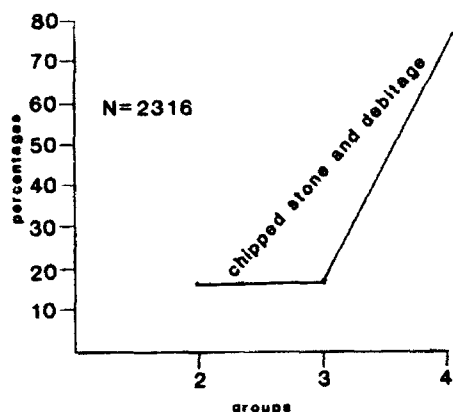


Figure 26. Percentage of lithic artifacts within product groups.

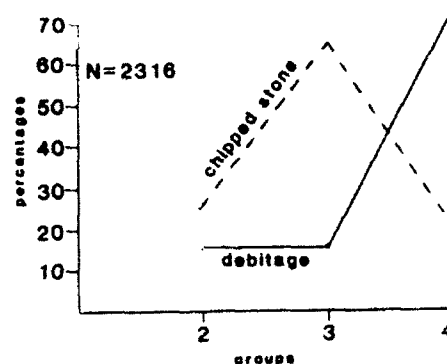


Figure 27. Percentages of chipped stone and of debitage within product groups.

Group 3 artifacts make up 17.7% (410) of the lithic assemblage (see Figure 26). The modified or chipped lithic artifacts in this product group account for 59.1% of the chipped stone assemblage. Of the Group 3 chipped stone, 50.0% are marginally (or lightly) modified flakes. Group 3 debitage makes up 16.1% of the debitage category (see Figure 27).

There are 1,527 artifacts which comprise Group 4. Only 16 are chipped stone, and they represent 18.2% of the chipped stone assemblage. Group 4 debitage accounts for 67.8% of all debitage (see Figure 27), and 65.2% of the entire lithic assemblage (see Figure 12). It is expected there would be a high percentage because this stage yields more debitage.



Of the 68 chipped stone artifacts, only five did not yield any evidence of use (see preceeding discussion under chipped stone assemblage). Only one artifact appeared to be a recycled tool. "Recycling involved the transformation of an implement from one shape and function to another. This procedure is most commonly applied to a worn or damaged artifact" (Collins 1979:63).

The inferences derived from the above presentation of the result of lithic analysis are those of local collection of materials. Materials were tested at the collection locale and were brought to the site where they were prepared for use. Approximately one-third of the locally collected materials were heated in preparation for modification. Once a core was made, it was either discarded or shaped further. The result of further shaping provided two items. One was a by-product of flakes, some of which were used as tools. Another item was a biface or uniface which was used as tool, discarded, or shaped further. Only one tool appeared to be recycled.

#### Functional/Temporal Assessment of Tools

The placement of lithic tools within the typological reductive system (Collins 1979) described earlier occasionally coincides with tools categories implying function, e.g., projectile points, scrapers. However, another source for making determinations on function was House (1975a). The usefulness of ascertaining the function of a tool is for making determinations of site function which can be used for intersite or intrasite comparisons. Site function may be determined through relative occurrences of basic functional categories. Determination of use-wear was used to make assessments of tool function. The use-wear analysis conducted on lithic tools was the "low-power

approach" described by Odell and Odell-Vereecken (1980). This method was chosen because it could be performed in a relatively short period of time (therefore, large samples can be studied), and it could provide answers to questions of intrasite patterning and tool function without being cost prohibitive. Its results were entered into the discussion of "Chipped Stone Assemblage" in the following chapter.

Projectile points were used as temporal diagnostics. Point type was determined using standard works such as Cambron and Hulse (1975), Chapman (1975 and 1980), and Lewis and Kneberg (1961). These point types, when regarded in light of cultural affiliation, enabled a relative temporal framework to be constructed.

There are a total of 88 lithic artifacts which appear to have been culturally modified. Of these, 20 are cores and core fragments. The remaining 68 are identifiable tool types except for two unidentifiable chipped stone fragments. There are two parts to this discussion of chipped stone assemblage. The first will be that of tool function as it relates to use wear analysis (Odell and Odell-Vereecken 1980) and comparisons by House (1975a). The second is temporal assessment as provided through typological analysis.

Five of the 68 tool types exhibited no evidence of use. Four were manufactured from quartzite making usage difficult to ascertain at this level; therefore, they are assigned to the "Indeterminate" category. The remaining 59 showed characteristics of use for 11 different activities, and six were used for more than one activity (Table 9). The primary activities appear to be preparing and processing functions, i.e., cutting, slicing/carving, scraping, and planning. A dependence on hunting is implied by the number of projectile points yielded by this investigation. Some wood working was being done as evidenced in the presence of tools with adzing and wedging wear.

Table 9. Count and type of use-wear of chipped stone artifacts by artifact type

Artifact Type	Cutting			Slicing/		Whittling	Baring	Chopping	Projectile	Indeter-		Not
	Cutting	Sawing	Carving	Scraping	Planing					Wedging	minate	Used
Primary Flaking												
Biface	2	2	3	1				1				1
Ovoid	2											
Triangular											1	1
Rectangular			1									
Rounded		1										
Hafted		1										
Fragments	1	1									2	1
												1
Uniface												
Ovoid			1									
Triangular											1	
Uniface/Biface								1				
Marginally modified <sup>o</sup>	3	1	4	7	10	2						
Unident Chipped												
store												1
Wedge										1		
Secondary Flaking												
Biface												
Hafted												
Fragments <sup>x</sup>	1	1	1									1
Drill												
Projectile Point*2	2						2		11			

\* 1 with multiple use  
<sup>o</sup> 3 with multiple use  
<sup>x</sup> 2 with multiple use

There are seven potentially identifiable projectile points, i.e., complete, in the assemblage collected (Figure 28). When correlated with local and regional sources, it was possible to type three of these. The three typed are Big Sandy Notched (Figure 28f), Gary (Figure 28b), and Motley (Figure 28a). The remaining four are classified as indeterminate. One is a finely serrated, straight stemmed point (Figure 28g), another is a corner notched point (Figure 28d), and a third is side notched (Figure 28c). The fourth indeterminate is similar to a Ledbetter point (Cambron and Hulse 1975:78) (Figure 28e). The points cover a temporal range of late Archaic to early Woodland (see Appendix B for a more complete description of each).

#### Lithic Resource Exploitation Patterns

Analysis of lithic utilization and procurement patterns by the inhabitants of the project area consisted of three parts:

- o Identification of lithic raw materials;
- o Comparison of worked versus unworked raw materials;
- o Examination of exploitation patterns over time.

Based on the results of archaeological investigation conducted at the site (Iroquois Research Institute 1979) and in the vicinity of the site (House 1975b; Klinger et al. 1981), several lithic raw materials have been identified. The major raw material recovered is Crowley's Ridge consisting of chert and quartzite (described in Appendix B). Other expected lithic materials were Mill Creek chert, Arkansas

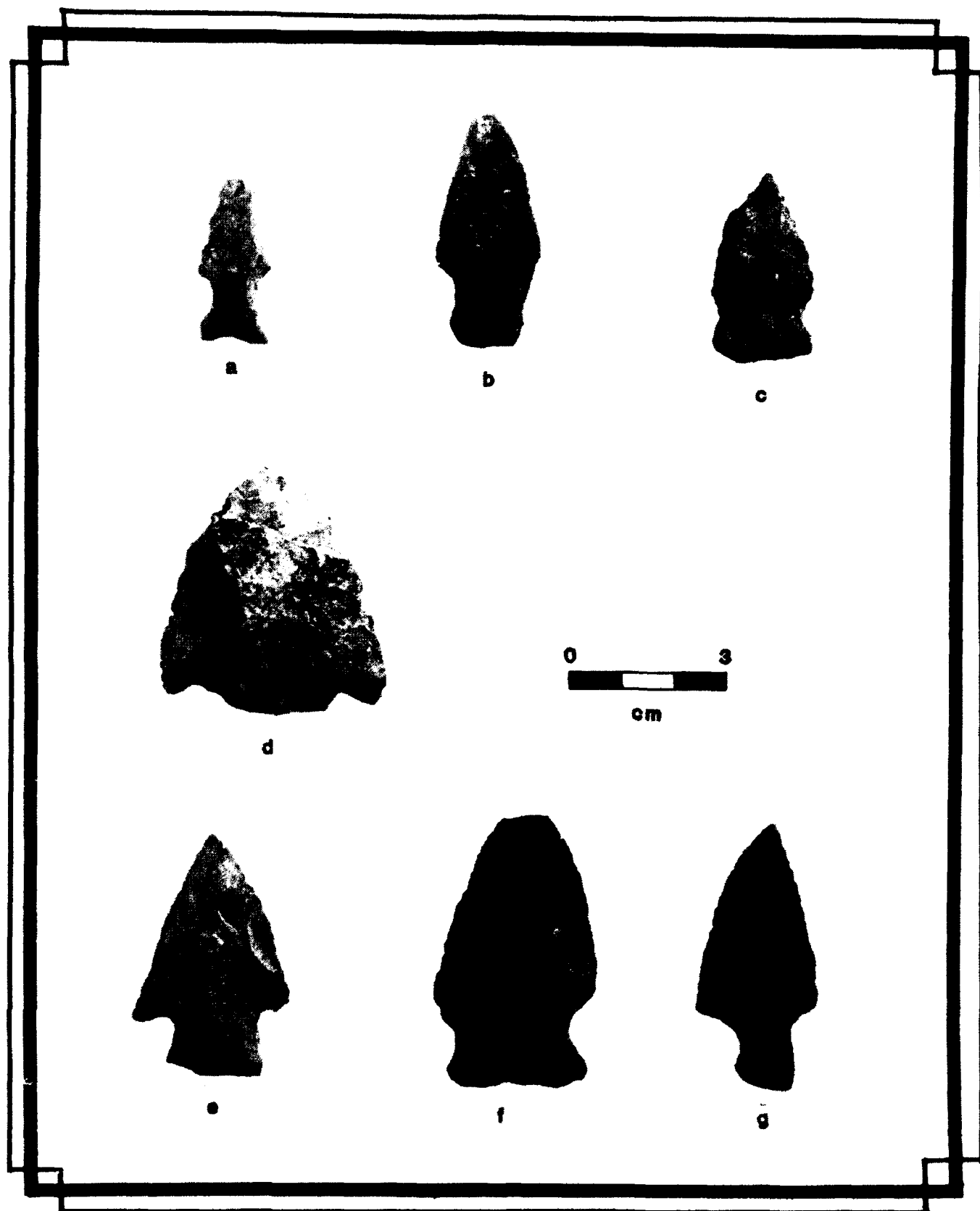


Figure 28. Projectile points recovered from 23DU227.  
a. Motley, b. Gary, c, d, e, g. Indeterminate  
f. Big Sandy Notched.

novaculite, quartzite, sandstone, ironstone, quartz, and rhyolite. However, because materials other than Crowley's Ridge were present in extremely minor amounts, they are all classified as "Other".

Once raw material of each lithic artifact had been determined, percentages of each raw material were examined in respect to whether the artifact was worked or was debitage. This comparison was used to determine the preferred raw material and make statements on trade. For example, if the majority of novaculite artifacts occur as tools, an initial assumption might be that the items were being traded. With further study and contextual information, this assumption could be expanded or dropped. Tool types were compared with raw materials to see if any tool was being manufactured from specific raw materials.

In describing the raw materials, House (1975b) provided some insight into possible sources of their location. Examination of percentages of raw materials used within a temporal framework may allow statements on the exploitation patterns within a specific time period. Then, comparisons made between chronological periods could provide means for determining if the exploitation patterns changed over time.

With 2,186 pieces of Crowley's Ridge chert and 108 pieces of quartzite representing a total of 99.1% of the 2,316 lithic materials, Crowley's Ridge gravels are clearly the majority raw material (Table 10). A description of Crowley's Ridge gravels is provided in the glossary in Appendix C. Heated Crowley's Ridge chert accounts for 37.7% of the 2,316 pieces, and 39.2% of the Crowley's Ridge chert. The remainder of the lithic

pieces consist of mottled and banded cherts, which may be Crowley's Ridge (House 1975a:82), translucent yellow chert, and one piece of novaculite.

Of the 88 modified lithics, 82 are Crowley's Ridge chert; 54 of which have not been heat altered. Three modified lithics were manufactured from quartzite, and three were made from other materials (see Table 10).

To conclude, the inhabitants of site 23DU227 appear to have taken advantage of their proximity to Crowley's Ridge (see Figure 5). Heat treating was almost as regular of a practice as not. The low occurrence of cores (discussed earlier) indicates the initial preparation of raw materials was away from the site. The large proportion of primary flaked tools and primary flakes substantiates this assumption.

#### Prehistoric Ceramic Analysis and Assemblage

Although, comparatively, not many prehistoric ceramic artifacts were recovered, those that were yielded were analyzed with the same regard as other artifacts. The laboratory crew sorted the ceramics into basic categories of temper types, surface treatment, and vessel part. The ceramics aided in making chronological assessments of the site in that the ceramic types were fitted into the regional chronology. At least one ceramic typological source was Phillips (1970).

Two temper types are represented in the 179 sherds comprising the prehistoric ceramic assemblage of 23DU227 (Table 11). Shell-tempered sherds are the minority ware with 18 (10.1%) sherds. The surface treatment of only 10 of these sherds could be

Table 10. Lithic raw material types by reduction sequence

	<u>Crowley's Ridge</u>				Total
	Heated Chert	Unheated Chert	Quartzite	<u>Other</u>	
Initial Reduction	5	14	1	-	20
Primary Flaking	19	30	2	1	52
Secondary Flaking	4	10	-	2	16
Debitage	<u>796</u>	<u>1308</u>	<u>105</u>	<u>19</u>	<u>2228</u>
Total	824	1362	108	22	2316



distinguished. These 10 are Neeley's Ferry Plain, and all are body sherds. The remaining eight are also body sherds, but their surface treatment is indistinguishable. Therefore, they have been classified as eroded.

Seventy of the 161 (89.9%) sand-tempered sherds have been classified as being eroded. Eroded serves as more of a catch-all term in that it refers to the inability to determine surface treatment because of erosion and/or breakage. Three forms of surface treatment have been recorded for the sand-tempered ceramics. Cordmarking occurs as the most frequent method of surface treatment of the sherds recovered from 23DU227. Only six of the 66 cordmarked sherds are rim fragments; the rest are body fragments. The second surface treatment is none or plain sherds. There are 22 Kennett Plain sherds: 21 body sherds and one base sherd. The third surface treatment is that of using a fingernail to decorate the sherd. Two fingernail marked sherds were recovered. One is typed as Barnes Pinched (Stephens 1954), and the other is typed as Indeterminate because a single fingernail impression was identified, but it was not possible to determine if it was part of a punctated or pinched impression. One sand-tempered conical podal support completes the prehistoric ceramic assemblage.

Temporally, the ceramics are primarily from the Dunklin phase as represented by sand-tempered Kennett Plain and Barnes Cordmarked sherds. The earlier Pascola phase is represented by the fingernail marked sherds, but they make up only 2.0% of the 100 temporally diagnostic sherds. The later Mississippian stage is represented by 18 (18%) shell-tempered sherds.

Table 11. Prehistoric ceramics at 23DU227 by type and provenience

	CSC	Excavation Units						Total
		A	B	C	D	P	EE	
Shell-tempered								
Neeley's Ferry Plain								
body	7						3	10
Eroded-body	1						7	9
Sand-tempered								
Kennett Plain								
body	9		6				6	21
base							1	1
Barnes Cordmarked								
body	10	1	16				33	60
rim	1		1				4	6
Fingernail Marked							2	2
Eroded								
body	14	1	17	1	1		34*	68
rim	1					1		2
Podal Support			1					1
Total	<u>43</u>	<u>2</u>	<u>42</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>90</u>	<u>180</u>

\*One piece is drilled.

## Fired Clay

One piece of fired clay was recovered from a controlled surface collection unit. It was the only artifact recovered from that unit. With a lack of cultural context, further statement beyond its presence is difficult. It does not appear to be tempered, and it is less than 1 cm<sup>3</sup> in size.

## Historic Analysis and Assemblage

Historic artifact analysis should provide a suitable framework whereby such sites may be dated and the social status of the occupants may be determined. Attempts were made to place all artifacts in categories pertaining to function, temporal attributes, and physical description. Pieces that were typable and/or datable were described in as much detail as possible. Historical artifacts were typed and dated using standard sources for references, e.g., Godden (1964) and Price (1979) for ceramics; Ferraro and Ferraro (1964), Lief (1965), Lorrain (1968), and Newman (1970) for glass; and Fontana and Greenleaf (1962) for metal.

## Historic Assemblage

Historic artifacts recovered from site 23DU227 include 51 ceramic pieces, 352 glass fragments, 150 metal pieces, and 10 pieces of other materials (Table 12). Included in the ceramic count are 18 pieces of stoneware, 3 pieces of earthenware, 1 piece of porcelain, and 28 architectural items including 23 brick fragments. Included in the glass count are 275 completely undecorated pieces and 77 decorated pieces. The

majority of glass fragments were clear (253) followed by brown (35), light green (18), light blue (15), white milk glass (14), manganese decolorized (7), pink tinted (2), and purple (1). There were also 7 pieces of slag recovered. Included in the metal count are 143 iron/steel pieces, 4 zinc pieces, 2 aluminum pieces, and 1 lead piece. The majority of the diagnostic pieces recovered are iron/steel architectural items.

Very little can be said of the temporal placement of this collection as few of the artifacts are temporally diagnostic. The majority of those that can be given a conclusive placement are post 1950. However, seven pieces of manganese decolorized glass (1880-1950) were recovered. These pieces represent less than 3% of the total collection.

The artifactual collection fails to support the presence of an historic occupation at this site. This is based on the relatively few or no clearly domestic artifacts present in the assemblage, e.g., window plate glass, nails, brick, etc. The question then remains as to how can their presence be explained. The most probable answer is that they were dumped there as refuse from a nearby occupation and were dispersed by flooding, clearing, and/or plowing. This is supported by the types of artifacts recovered, the relatively small number of artifacts recovered, and the close proximity of homes as shown on a 1956 USGS 15' map.

#### Fire-Cracked Rock and Chunk/Shatter

A total of 1,442 pieces of fire-cracked rock and 466 pieces of chunk/shatter were recovered from site 23DU227. Five hundred and one pieces (34.7%) of fire-cracked

Table 12. Number and type of historical artifacts  
recovered from site 23DU227

Ceramics

Porcelain	1
Earthenware, white paste	
plain, undecorated	1
decalcomania	<u>1</u>
Subtotal earthenware, white paste	2
Earthenware, colored paste	
colored glaze	1
Stoneware, white paste	
plain, undecorated	9
Stoneware, yellow paste	
plain, undecorated	1
painted decoration	<u>1</u>
Subtotal stoneware, yellow paste	2
Stoneware, colored paste	
light brown slip	1
brown slip/glaze	3
clear glaze interior,	
white paint exterior	2
brownslip, lead glaze	<u>1</u>
Subtotal stoneware, colored paste	7
Architectural Items	
tile	1
brick	4
cement	<u>23</u>
Subtotal architectural items	28
Burned - unidentifiable	<u>1</u>
TOTAL CERAMICS	51

Glass

Bottle/jar Fragments

Lip/neck

Foodstuff, plain, clear	3
Foodstuff, mold marked, clear	2
Pharmaceutical, plain, brown	1
Alcoholic, tool finished, manganese decolorized	1

Unidentified, plain	
Clear	8
light blue	1
white milk glass	1
Unidentified, embossed, clear	1
Subtotal lip/neck, bottle/jar fragments	<u>18</u>
Body	
Beverage bottle, plain	
clear	1
light green	2
Beverage bottle, painted	
clear	3
light green	1
Foodstuff, plain, clear	2
Foodstuff, mold marked, clear	2
Pharmaceutical bottle, graduated, clear	1
Pharmaceutical bottle, 3 oz. mark, clear	1
Unidentified, plain	
clear	176
purple	1
light blue	13
brown	29
manganese decolorized	3
light green	11
Unidentified, embossed	
clear	7
light green	1
Unidentified, mold marked	
clear	10
brown	1
manganese decolorized	1
Unidentified, decal, clear	1
Subtotal body, bottle/jar fragments	<u>267</u>
Base	
Beverage bottle, plain, clear	3
Foodstuff, mold marked, clear	2
Unidentified, plain	
clear	11
light blue	1
light green	2
Unidentified, embossed	
clear	4
light green	1
Unidentified, mold marked	
clear	1
manganese decolorized	1
Unidentified, makersmark (Owens-Illinois Glass Co.)	
clear	3
Subtotal base, bottle/jar fragments	<u>29</u>

Tableware	
mold decorated, clear	1
Holloware	
mold decorated/pressed glass, clear	1
Jar lid liner	
embossed, white milk glass	13
Unidentified function	
plain	
clear	
brown	8
manganese decolorized	1
pink	1
pressed glass, floral design, pink	1
Subtotal unidentified	<u>14</u>
Burned	
clear	1
brown	1
Subtotal burned	<u>2</u>
TOTAL GLASS	345

## Metal

Iron/Steel	
Unidentified	65
container frags	4
can key	1
machinery	2
cast iron	1
hardware	
unidentified	1
carriage bolt with nut	1
bolt with washer	1
bolt with nut	1
wire nail	8
wire staple	3
wire	33
barbed wire	15
door hinge	1
lock plate	1
Subtotal hardware	<u>65</u>
Belt buckle	1
Comb	1
Fastener	1
Enameled vessel	1
Burned	1
Subtotal iron/steel	<u>143</u>

Zinc		
Unidentified	2	
fruit jar lid	<u>2</u>	
Subtotal zinc	4	
Aluminum		
container frag	1	
pop top	<u>1</u>	
Subtotal aluminum	2	
Lead		
comb	1	
TOTAL METAL		150
<u>Other</u>		
rubber	1	
carbon rod	2	
leather (shoe fragment)	1	
plastic		
unidentified	5	
shotgun shell	<u>1</u>	
Subtotal plastic	6	
TOTAL OTHER		10
SITE TOTAL		<u>556</u>



rock and 101 pieces (21.6%) of chunk/shatter were recovered from the surface of this site. Initial observation indicated that the large portion of fire-cracked rock and chunk/shatter could be a result of land clearing and agriculture. However, after further analysis it became apparent that the majority of the material was not confined to the plowzone but existed with a relatively even distribution to a depth of 50 to 70 cmbs or to the base of the cultural material bearing strata. Furthermore, the subsurface occurrence of fire-cracked rock and chunk/shatter was concentrated in three units placed within the rise that contained the surface artifact concentration. These units contained 85.6% (806) of the fire-cracked rock and 74% (345) of the chunk/shatter recovered from all subsurface investigation. Therefore, their presence, at least in the units, is related to the prehistoric occupation(s).

#### Specialized Analyses

Pollen - Pollen analysis is continuing to be a useful method for archaeologists. "Through the recovery and analysis of fossil pollen grains palynologists are able to reconstruct past vegetations, and through inference, suggest possible paleoclimatic conditions for the past" (Bryant 1978:25).

Phytolith - This form of paleoenvironmental analysis is still a new technique to many archaeologists. Applications of phytolithic identification have been presented in recent literature (Rovner 1971, Carbone 1977, and Pearsall 1982). Phytolith analysis is a complementary method to pollen and macrobotanical analysis. It can be used to identify cultivated plants, investigate the evolution of cropping systems, and reconstruct past environments (Pearsall 1982:864-867). Although it has showed success,

phytolith analysis has not been fully or widely accepted as a completely viable analytical tool. Therefore, samples checked were taken from the same soil stratum that was checked for pollen. Comparisons between results using the two methods were made. Appendix E provides results of pollen and phytolith analysis.

### Curation

All records and material collections yielded by this investigation were housed at ECI's Dallas office until the final report had been accepted and mailed. At that time, the records and material collections were sent to Washington University in St. Louis, Missouri. Washington University is presently involved in assembling archaeological collections to provide an additional regional repository to complement the one at University of Missouri - Columbia, and Washington University has agreed to curate all records and material collections we generate.

### Summary

The investigation of site 23DU227 has indicated that the site recorded on the eastern portion of Ditch 19 does not extend across the ditch. There were no archaeological site materials yielded beneath the western levee. However, surface collecting and subsequent excavation revealed the location of a separate site area along the western edge of the project boundary. This site area is on a low, circular rise of about 800 m<sup>2</sup>. It yielded artifacts to the water table, a depth of approximately 1.0 m below ground surface. Although artifact count depreciated considerably in the preceeding levels, it is

possible a buried component may exist below this water table. Excavations did indicate the integrity of the artifacts may be lacking. The previous presentation of results from fieldwork and analysis has been summarized to provide the following description of the separate occupation.

Based on the chronology supplied through projectile point and ceramic typology (Figure 29), the site was occupied over a fairly continuous period. The projectile points imply a time frame beginning with late Archaic. The ceramic types provide a chronological framework of Pascola phase (sand-tempered fingernail marked) through to Mississippi stage (shell-tempered sherds). The manifestations of occupation at the site is contained in Stratum B in Units A - E and EE (see Figures 10, 11, and 12). Artifacts were recovered from the strata above and below. However, Stratum A includes the plowzone and is highly disturbed. Stratum C may contain artifacts as a result of water action. Within Stratum B, artifacts representing various components appear mixed, and no cultural horizons could be discerned. Paleoenvironmental analysis substantiated the severe disturbance of the site. The cultural layer completely disappears as it approaches the levee and appears to be confined to the rise as evidenced in the lack of artifacts recovered from areas outside the rise.

The site identified within the rise is similar to site 23DU243 described by Klinger et. al. (1981). Both are small prehistoric archaeological sites with 23DU227 being about 200 m<sup>2</sup> smaller in size. Both are located within sandy rises in a soybean field. Soil stratigraphy varies in that the clay underlying the sand was never encountered at 23DU227. Artifact assemblages are similar in that a low number of prehistoric artifacts and a high percentage of lithic debitage was recovered. Site 23DU243 was

Figure 29. Chronology of projectile points and prehistoric ceramics recovered from 23DU227.

	Cultural Tradition	Cultural Periods and/or Phases	Representative Ceramics	Projectile Points
AD 1500	Mississippian		Neeley's Ferry Plain	
AD 1000	Woodland	Dunklin	Kennett Plain Barnes Cord-marked	Gary
		Pascola	Fingernail Marked	Motley
1000 BC				
	Archaic			Big Sandy
8000 BC	Paleo-Indian			

interpreted as being a workshop site (Klinger et. al. 1981:137), and the similarity of lithic artifacts at 23DU227 indicates it also functioned as a workshop. Use wear analysis has enhanced the assessment of site function in that it has been determined that preparing, processing, and hunting activities were conducted by the inhabitants of the site. The site area investigated in this study yielded artifacts over the same time periods as 23DU243, i.e., late Archaic, Woodland, and Mississippi period.

#### Cohesion of Research Design and Results

When applying the results of fieldwork and analysis with the needs of the research design, it becomes apparent that several of the research domains are no longer applicable, and some can only be minimally pursued. Each of the seven research domains and the ability of each to be dealt with by this investigation is provided.

Research Domain #1. The major purpose of this research domain was to determine the effect of levee construction, particularly fill, on a site. Because the site is not present under the levee, comparative results could not be obtained.

Research Domain #2. The surface collection and test units' artifacts were used to better define and refine the existing site information including site vertical and horizontal boundaries. No distinct component beyond a mixed cultural component was identified. No activity areas were delimited.

Research Domain #3. Although plant remains were recovered from the site area, the results of their analysis indicated the site does not retain enough integrity to warrant interpretation.

Research Domain #4. No human osteological remains were recovered; nor did there seem to be potential for future recovery.

Research Domain #5. It was possible to provide a slight comparison between the site investigated and another site in the region. However, the extreme degree of disturbance negates any potential for adding much more than material cultural information. Without the isolating of components or identification of house patterns, research questions for this domain could not be approached.

Research Domain #6. There was little, if no, trade activity indicated through this investigation. Except for a rare piece of exotic lithic material, all lithics were manufactured from local cherts and quartzites. There is no evidence the prehistoric ceramic manufactures used non-local clays or styles.

Research Domain #7. Information on various date sets was provided through this study, and it appears in the preceding text.

## VI. CONCLUSIONS AND RECOMMENDATIONS

To conclude, the proposed extension of Ditch 19's western boundary and subsequent levee construction will not affect the cultural resources at 23DU227 adversely. This conclusion was reached after investigations between the western edge of the ditch and the western edge of the project boundary revealed that site 23DU227 does not extend across the ditch. A separate, discreet location of artifacts was found in the project area, beginning approximately 25 m from the ditch edge. The impact to it will be that from placement of levee materials on it. Except for an occasional isolated artifact, or recent dumping of trash, no other cultural resources were observed.

Our investigation revealed that the site area isolated, identified, and tested by this investigation lacked site integrity. The site has been subjected to a 100% controlled surface collection, and three 1 x 1 m test units were excavated within its parameters. Because of the lack of site integrity, further investigation is not warranted; also, the levee fill will seal any information is it likely to contain. However, it should be noted that excavation was terminated because the water table was reached. The soil the site area is contained within is entirely made up of sand. Excavations never reached the bottom of the sand. Therefore, there is some likelihood of a buried deposit below the water table. If this site should be directly impacted by heavy machinery, we recommend it be closely monitored for these buried resources.

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## **APPENDIX A**

### **Scope of Work**

## SECTION C - DESCRIPTION/SPECIFICATIONS (SCOPE OF WORK)

Investigation, Data Recovery, Analysis, Interpretation and Report Preparation for Cultural Resources Mitigation along Ditch 19 Channel Enlargement Project, Site 23DU227, Dunklin County, Missouri

### C-1. GENERAL.

C-1.1. The primary purpose of the cultural resources mitigation report is to serve as a planning tool which aids the Government in meeting its obligation to preserve and protect significant elements of our nations cultural heritage. The report will be in the form of a comprehensive, scholarly document that not only fulfills mandated legal requirements but also serves as a scientific reference for future professional studies. As such, the report's content must not only be descriptive but also analytic in nature.

C-1.2. The mitigation and report represent fulfillment of the obligations of the Memphis District toward cultural resources as required by the National Environmental Policy Act of 1969 (PL 91-190); National Historic Preservation Act of 1966 (PL 89-665); Protection and Enhancement of the Cultural Environment (EO 11583); Advisory Council Procedures for the Protection of Historic and Cultural Properties (36 CFR 800); Preservation of Historic and Archeological Data 1974 (PL 93-291); and Identification and Administration of Cultural Resources (33 CFR 305).

C-1.3. An adequate plan to mitigate the effects of the Ditch 19 Channel Enlargement Project, Dunklin County, Missouri, on one archeological property (23DU227) determined eligible for inclusion on the National Register has been accomplished by utilizing a program of systematic subsurface analyses.

C-1.4. For all work performed, the Contractor shall provide to the Contracting Officer ten (10) copies of the draft and fifty (50) copies of the final technical report, together with one unbound, reproducible copy of the results of this investigation in accordance with the terms of the contract and this Scope of Work.

C-1.5. The extent and character of the work to be accomplished by the Contractor shall be subject to the approval of the Contracting Officer.

C-1.6. The Contractor shall furnish all transportation, personnel, material, and equipment necessary to expeditiously perform all services outlined in this Scope of Work. A highly qualified professional archeologist shall be on site during all field activities to supervise lesser trained personnel. The work will be performed by an appropriate mix of professional manpower as would be deemed necessary by a reasonably prudent Contractor.

C-1.7. The quantity and quality of all archeological mitigation performed under this contract will be consistent with the research design entitled "Ditch 19 Mitigation Research Design," which is attached to and made a part hereof. (Attachment No. 1)

See attached

Amendment No. 0001

C-1.8. The technical background data .....

C-1

See attached

Amendment No. 0001

## C-2. SAMPLING TECHNIQUES.

### C-2.1. Stage I - Systematic Sampling of the Site.

a. In order to define reliable site boundaries and locate surface artifact density clusters, an intensive, systematic collection of the surface will be conducted. All the site between the project boundary and the start of the existing fill materials will be uniformly plowed, naturally or mechanically wet-down, and then the surface totally collected.

b. The surface will be collected in two meter square units. In order to obtain the most information possible and to avoid bias in collecting certain classes of data and artifact types, the entire site shall be collected.

c. Hand excavation of units will be performed to delineate the extent of any features or structures which may be discovered beneath the fill materials, as well as providing information relative to the spatial relationships of any activity areas and associated artifacts.

d. Removal of levee materials will be accomplished with power equipment (backhoe, frontend loader, tractor and blade, small bulldozer, etc.). The removed materials will be placed on the levee area. Three trenches will be dug in areas that have been shown (by the surface collection) to have the highest density of materials extending under the levee. The trenches will be a minimum of one meter wide. Power equipment may be used to remove the fill materials to within 30 cm. of the natural ground surface. The remaining materials will be removed by hand. The levee trenches walls will be graded to the proper angle of repose, shored, or made safe by other equivalent means if the depth requires such safety procedures. The Principal Investigator, field and crew chiefs will read "Section 22" U. S. Army Corps of Engineers, Safety and Health Requirements, EM385-1-1, April 1981 (Government furnished material). See attached research design for more information.

See attached  
Amendment No. 0001

e. <sup>All</sup> ~~hand~~ excavated archeological <sup>test</sup> ~~excavation~~ <sup>units</sup> ~~unit~~ (1 meter unit or trench) will be placed in the center of each of the levee trenches. These excavations will be accomplished in a manner consistent with methods described in paragraph C-4.3 and the research design. The archeological excavation will be refilled in accordance with the methods described in paragraph C-4.4.

f. The levee trenches will be refilled by the Contractor at the beginning of Stage III. The trenches need only be refilled; it is not necessary to compact and precisely restore the levee.

g. Upon completion of Stage I work, the field summary report shall be submitted to the Contracting Officer. This report shall present an argument and supporting data for or against the initiation of Stage II work for the site.

### C-2.2. Stage II - Excavation of Site Areas.

a. If Stage II is required, the following work will be completed. The 8 meter wide area that is to be removed will be cleared of all the fill

b. If Stage II is not required for the site all subsurface excavations will be refilled (at no extra cost to the Government) to their original surface level. If Stage II is required for the site, the subsurface units will remain open unless the Contracting Officer directs otherwise. However, upon completion of Stage II all subsurface units will be refilled (at no extra cost to the Government) to their original ground surface level. The areas of levee materials that are removed will be refilled when the site excavations are refilled. All refilling will be at the Contractor's expense; there will be no extra cost to the Government.

See attached  
amendment No. 0001

### C-2.3. Stage III - Analysis and Reporting.

b. This general mitigation plan and attached research design will be followed throughout.

### C-3. DEFINITIONS.

C-3.1. "Cultural resources" are defined to include any building, site, district, structure, object, data, or other material relating to the history, architecture, archeology, or culture of an area.

C-3.2. "Mitigation" is defined as the amelioration of losses of significant prehistoric, historic or architectural resources which will be accomplished through preplanned actions to preserve such resources or recover the data they contain by application of professional techniques and procedures. Mitigation of losses of cultural resources includes, but is not limited to, such measures as: (1) recovery and preservation of an adequate sample of archeological data to allow for analysis and published interpretation of the cultural and environmental conditions prevailing at the time(s) the area was utilized by man; (2) recording, through architectural quality photographs, districts, and objects, and deposition of such documentation in the Library of Congress as part of the Historic American Buildings Survey or the Historic American Engineering Record; (3) relocation of buildings, structures, and objects; (4) adoption of alternative plans to allow cultural resources to remain in place; (5) reduction or elimination of impacts by engineering solutions to avoid mechanical effects of wave wash, scour, sedimentation, and relative processes and the effects of saturation.

C-3.3. "Significance" is attributable to those cultural resources of historical, architectural, or archeological value when such properties are included in or have been determined by the Secretary of the Interior to be eligible for inclusion in the National Register of Historic Places after evaluation against the criteria contained in How to Complete National Register Forms.

### C-4. GENERAL PERFORMANCE SPECIFICATIONS.

C-4.1. The Contractor shall conduct a mitigation of the site commensurate with the level of a cultural resources mitigation as described in paragraph C-3.2. To the extent permitted by other instructions in this Scope of Work the Contractor shall follow the Guideline For Reporting, Phase II Testing of Archeological Site Significance and Evaluation of National Registers Eligibility and Guideline For Contract Cultural Resources Survey Report.

C-4.2. Since horizontal site boundaries have not been precisely delineated, they shall be derived by the use of controlled surface collection procedures. Site boundaries shall be related to a site datum and to a permanent reference point.

C-4.3. Hand excavated subsurface test units shall be excavated in levels no greater than 10 centimeters. Where cultural zonation or plow disturbance is present, however, excavated materials shall be removed by zones. Subsurface test units shall extend to a depth of at least 20 centimeters below artifact bearing soils. All excavated material (including plow zone material) shall be screened using 1/4" hardware cloth. See attached research design for more detailed subsurface testing information.



C-4.4. Stringent horizontal spatial control will be maintained by relating the location of all collection units to the primary site datum. Three permanent datum points will be established at the site before the commencement of any other work. These datum markers will be constructed of a high quality, high density ferrous metal (i.e., high carbon steel, etc.) rod. Each rod must be a minimum of 5 cm. in diameter and 1.5 meters long; however, they may be larger. The rods will be placed in three different areas of the site - preferably on cardinal compass points. Each rod will be placed into the ground in such a manner that the rod end extends 5 cm. above the ground surface. The top, end surface of each rod will be marked (by filing, cutting, etc.) with an "X" as a plum point for measurement purposes and a number (1, 2, or 3) for identification. All boundary marks, test or collection squares, diagnostic or unusual artifacts or other measurements will be located with a transit

C-4.5. The Contractor shall keep standard field records which will include, but are not limited to, field notebooks, state approved site forms, (prehistoric, historic, architectural), field data forms and graphics and photographs. Publishable quality site maps with precise boundaries and proposed impact boundaries will be submitted for each site.

C-4.6. The Contractor will obtain all necessary permits, licenses, and approvals for all local, state and Federal authorities. Should it become necessary in the performance of the work and services, the Contractor shall, at no cost to the Government, secure the rights of ingress and egress on properties not owned or controlled by the Government. The Contractor shall secure the consent of the owner, his representative, or agent prior to effecting entry on such property.

C-4.7. All operations shall be conducted under the supervision of qualified professionals in the discipline appropriate to the data that is to be discovered, described or analyzed. Vitae of supervisory personnel may be required by the Contracting Officer.

C-4.8. Techniques and methodologies used during the mitigation shall be representative of the current state of knowledge for their respective disciplines.

C-4.9. Innovative approaches to data location, collection, description and analysis, consistent with other provisions of this contract and the Cultural Resources requirements of the Memphis District, are encouraged. Such approaches will require prior consultation with the Contracting Officer.

C-4.10. The Contractor shall supply such graphic aids (ex: profile and plan drawings) or tables as are necessary to provide a ready and clear understanding of spatial relationships or other data discussed in the text of the report. Such tables or figures shall appear as appropriate in the body of the report.

C-5. DESCRIPTION OF FIELD WORK.

C-5.1. Familiarization. The Principal Investigator (refer to paragraph C-11) shall review existing data concerning site 23DU227. Further, the Principal Investigator shall review previously prepared reports and articles which are concerned with the occupations and traditions of the site. The Principal Investigator shall also read the document Predicting Cultural Resources in the St. Francis River Basin - A Research Design (Iroquois Research Institute 1978)(Government furnished material).

C-5.2. Data Recovery Program and Study Area.

a. In Stage I, the entire exposed site area within the project right-of-way will be systematically surface collected. The collection of this data will be accomplished in a manner consistent with methods described in paragraph C-2.1.a.

b. Site boundaries will be located as completely as possible.

c. Stage III, Analysis and Reporting, will be related directly and explicitly to the research design. The report will be completed in a manner consistent with guidelines described in paragraph C-7.

d. The site, 23DU227, is located on Ditch 19, Dunklin County, Missouri,

. The site measures approximately 100 meters north-south and 75 meters east-west. The site does appear to extend under the levee. The site is on the west side of Ditch 19 (refer to Research Design).

C-5.3. In all instances cultural remnants collected will be washed, catalogued and stored in such a manner that they can be safely transported to an acceptable repository.

C-5.4. In all instances recovered artifacts will be described and tabulated minimally by type, spatial provenience and, when possible, temporal context. Morphological and/or functional artifact typologies employed in analysis will be consistent with the research strategy employed during the course of contract activities. Photographs will be used to show groupings of artifacts in situ. Where such artifacts may be considered of particular interest or quality, photographs of the objects will be made against a suitable contrasting background.

C-5.5. In all instances descriptive notations will also be made of cultural evidence (e.g. firepits, differentiated soil strata, post holes) which is discovered. Photographs of these features will be made as appropriate. During the conduct of all field work, precautions will be taken to protect the site from vandalism, bad weather, and anything that will cause harm to the site and the information that it contains.

C-5.6. The Contractor shall perform carbon 14 testing dating, if applicable.

C-5.7. Curation of all materials, artifacts and data resulting from this activity shall conform to Missouri state standards, and access by Federal and state agencies and appropriate scholars will be guaranteed.

C-5.8. Slides and notations will accompany the work as outlined in paragraphs C-5.4 and C-5.5.

C-6. LABORATORY ANALYSIS.

Laboratory analysis will be routine tests necessary to determine age, occupation, composition, soil stratigraphy, and predicted aboriginal faunal and floral patterns.

C-7. REPORTS OF MITIGATION AND DATA INTERPRETATION.

C-7.1. The technical report submitted as part of this contract will contain at least the following information:

a. Title Page. The title page should provide the following information: the type of mitigation undertaken; the cultural resources which were assessed (archeological, historical, architectural); the project name, location (county and state) and the date of the report; the Contractor's name; the contract number; the name of the author(s) and/or the Principal Investigator; the signature of the Principal Investigator; and the agency for which the report is being prepared.

b. Abstract. The abstract should consist of a short statement of problems addressed, constraints, strategies employed, results obtained and contributions of the work.

c. Table of Contents.

d. Introduction. This section shall include the purpose of the report; a description of the proposed project; the location of the proposed project, including a map of the general area (preferably a 7.5 or 15 minute U.S.G.S. map) and a project map (no site maps, or locations, will appear in the report); and the dates during which the field survey and testing were conducted. The introduction shall also contain the name of the institution where recovered materials will be curated.

e. A Research Design addressing specific archeological research problems and explicitly relating field and analytic methods to these problems.

f. A Design of Field Methods describing in sequence the method employed and time involved from Contractor arrival on site until completion of field work.

g. A Descriptive Inventory of Cultural Remnants including descriptions as referenced in paragraphs C-5.4 and C-5.5 and complimented with drawings and photographs. Photographs of particularly significant or type representative artifacts or evidence shall be used in the report. Appropriate maps will be supplied as a part of contract correspondence.

h. Conclusions Reached and Significance of Data to include formulation of conclusions and the relation of the data gathered as compared to the accepted view of the pre-modern setting.

i. Documentation of the entire mitigatory effort to include 35 mm slides of each phase of excavation, analyses, preservation and publication activities.

j. References (American Anthropological Association Format).

k. Roster of project personnel and vitae of project principals.

C-7.2. If required, the popular report will be a description of project history, research problems, field technologies and results of the tests and analyses. The entire report will be written in conventional language, and work shall be illustrated in easily understood line drawings and clear photographs. The contribution of this work to the heritage of southeastern Missouri residents will be discussed.

*(required only if Stage II is performed)*

C-7.3. Both the technical report and popular report ~~(if required)~~ shall be dated and shall be written in a concise manner, clearly describing the archeological resources; typed on good quality white bond paper; accompanied with a listing of cited sources and an abstract prepared by the Principal Investigator. The abstract shall describe the research concept and the significance of the work. The reports shall be bound on a suitable cover and conspicuously labelled. Ten (10) copies of draft and fifty (50) copies of final technical and popular reports, together with one unbound, reproducible copy of each report shall be provided.

C-7.4. Maps describing resource location will be furnished separately from the report.

C-7.5. Professional quality 35 mm single lens reflex or comparable quality cameras will be employed to take required photographs. A suitable measuring device will appear in photographs to enable the viewer to estimate dimensions.

#### C-8. SUBMITTALS.

C-8.1. The Contractor shall, unless delayed due to causes beyond his fault or negligence, complete all work and services under the contract within the following time limitations after receipt of notice to proceed.

a. One copy of the field summary report (Stage I) shall be submitted within 70 calendar days.

b. Ten (10) copies of the draft technical report (Stage III) shall be submitted within 130 calendar days.

c. The Government shall review the draft technical report and provide comments within 20 calendar days after receipt of the draft technical report.

d. An original and 50 copies of the final technical report shall be submitted within 160 calendar days following the Contractor's receipt of the Government's comments on the draft technical report.

e. If the Government review exceeds 20 calendar days, for each submittal, the period of service of the contract shall be extended on a day-by-day basis equal to any additional time required by the Government for review.

C-8.2. On the written request of the Contracting Officer, the Contractor shall submit, at no additional cost to the Government, a copy of all records described in paragraph C-4.5.

C-8.3. All maps which indicate or imply actual site locations shall be included in reports as a readily removeable appendix (ex: envelope). In order to prevent potential damage to cultural resources, no information shall appear in the body of the report which would suggest resource location.

C-8.4. No logo or other such organizational designation shall appear in any part of the report (including tables or figures) other than the title page.

#### C-9. INFORMATION AND MAPS FURNISHED BY THE GOVERNMENT

C-9.1. The Government shall upon request of the Contractor provide available channel construction drawings and quadrangle maps to the Contractor in reasonable quantities, not to exceed ten (10) of each. Such drawings and maps shall be furnished without cost to the Contractor and may be retained by the Contractor.

C-9.2. The Government will make available to the Contractor (before the start of Stage I work) all relevant archeological documentation previously collected by Iroquois Research Institute, under Contract No. DACW66-78-C-0054, pertaining to Ditch 19 archeological investigations.

#### C-10. CURATION.

C-10.1. The Contractor shall provide curation for all materials, artifacts, and data resulting from this activity until such time as investigations are completed and approved by the Contracting Officer. Materials, artifacts and data shall be marked and stored in conformance to Missouri state standards. Every effort will be made to curate all materials within the state of Missouri.

C-10.2. The Contractor shall arrange for placement of the recovered materials with appropriate state agencies or public institutions. Representatives of Federal and state agencies and appropriate scholars shall be guaranteed access to these materials. Permission must be obtained from each private land owner by the Contractor prior to removal of any artifact or objects of antiquity.

C-11. DESIGNATION OF PRINCIPAL INVESTIGATOR.

The Contractor shall designate in writing the name of the Principal Investigator for the excavation and report. This individual shall be responsible for conduct of work, validity of report and liaison between the Contractor and the Contracting Officer. The Principal Investigator shall sign the reports.

C-12. PERIOD OF SERVICE.

C-12.1. The Contractor shall, unless delayed due to causes beyond his control and without his fault or negligence, complete all work and services under this contract within the following time limitations.

<u>Activity</u>	<u>Due Date</u> (Beginning with acknowledged date of receipt of Notice to Proceed for Stage I & III)
Stage I Field Work Begins	within 10 days
Submittal of Field Summary Report (Stage I)	within 70 days
Submittal of Draft Technical Report (Stage III)	within 130 days
Submittal of Final Technical Report (Stage III)	within 310 days

C-12.2. The Contractor shall make any required corrections after review by the Contracting Officer of the draft technical report. A corrected copy of this report shall be returned by the Contractor to the Contracting Officer not later than 30 days following receipt of the Government comments.

C-12.3. In the event that any of the Government review periods are exceeded and upon request of the Contractor, the contract period will be extended on a calendar day for day basis. Such extension shall be granted at no additional cost to the Government.

C-13. TESTIMONY IN JUDICIAL PROCEEDINGS.

The Contractor will furnish competent personnel to attend conferences and furnish testimony in any judicial proceedings involving the archeological and historical excavation, analysis, and data interpretation of the site(s). When required arrangements for these services and payment therefor will be made by representatives of either the Corps of Engineers or the Department of Justice.

C-14. RELEASE OF INFORMATION.

Neither the Contractor nor his representatives shall release any sketch, photograph, report or other material of any nature obtained or prepared under this contract prior to acceptance of the final reports without the specific written approval of the Contracting Officer.

C-15. PROFESSIONAL PERSONNEL STANDARDS.

C-15.1. The Contractor shall utilize a systematic, interdisciplinary approach to conducting the study. Specialized knowledge and skills will be used during the course of the study to include expertise in archaeology, history, architecture, geology and other disciplines as required. Techniques and methodologies used for the study shall be representative of the state of current professional knowledge and development.

C-15.2. The following minimal experiential and academic standards shall apply to personnel involved in cultural resources investigations described in this Scope of Work:

a. Archeological Project Directors or Principal Investigators (PI). Persons in charge of an archeological project or research investigation contract, in addition to meeting the appropriate standards for archeologist, must have extensive experience in field project formulation, execution and technical monograph reporting. Suitable professional references shall be made available within 10 days upon written request of the Contracting Officer. If prior projects were of a sort not ordinarily resulting in a publishable report, a narrative shall be included in the submitted vitae, detailing the proposed project director's previous experience along with references suitable to obtain opinions regarding the adequacy of this earlier work.

b. Archeologist. The minimum formal qualifications for individuals practicing archeology as a profession are a B.A. or B. S. degree from an accredited college or university, followed by two years of graduate study with concentration in anthropology and specialization in archeology during one of these programs, and at least two summer field schools or their equivalent under the supervision of archeologists of recognized competence.

c. Standards for Consultants. Personnel hired or subcontracted for their special knowledge and expertise must possess academic and experiential qualifications in their own fields of competence. Such qualifications are to be documented by means of vitae attachments and submitted within 10 days upon written request of the Contracting Officer.

d. Other Supervisory Personnel. Persons in any archeological supervisory position must hold a B.A. or B.S. degree with a concentration in archeology and a minimum of two years of field and laboratory experience (which may include field school).

e. Crew Members. All crew members must have prior experience compatible to the tasks to be performed under this contract.

### Ditch 19 Mitigation Research Design

The Ditch 19 Archeological Mitigation Project was designed as a multistage program to archeologically identify and explain cultural change through time in a confined geographical space. Two major goals are to adequately document the nature and extent of the tested archeological site and to assess the archeological significance of the site in relation to other sites in the area.

Presently (contrary to Federal guidelines), no specific regional or state research design exists for the area. This research design will attempt to set forth questions that can be answered by the limited excavations planned for the site. These questions will provide information that can be correlated and compared with other site studies in the region.

There are four recognized components at 23DU227: Archaic, Middle Woodland, Middle Mississippian, and Euro-American Pioneer occupations. All components will be dated by several methods, if possible. Should this not be possible, the Contractor must explore the circumstances covering the lack of data. Period identification will be based on projectile point or ceramic seriation. Relative dating will be accomplished by the use of stratigraphy. In addition, radiocarbon, thermoluminescent, fission-track, alpha-recoltrack, or archeomagnetic dating techniques will be employed when possible.

Stage I will have a two fold purpose. First, is to more accurately define the site's horizontal surface boundaries, establish surface artifact density clusters, and determine what components are represented on the surface. Second, is to establish the existence or non-existence of the site beneath the existing fill material.

See attached  
Amendment No. 1

(Attachment No. 1)



In order to define reliable site boundaries and locate surface artifact density clusters, an intensive, systematic collection of the surface will be conducted. All the site between the project boundary and the start of the existing fill materials will be uniformly plowed, naturally or mechanically wet-down, and then the surface totally collected.

The surface will be collected in two meter square units. In order to obtain the most information possible and to avoid bias in collecting certain classes of data and artifact types, the entire site shall be collected.

Stringent, horizontal, spatial control will be maintained by relating the location of all collection units to the primary site datums. Three permanent datum points will be established at the site before the commencement of any other work. These datum markers will be constructed of a high quality, high density ferrous metal (i.e. high carbon steel, etc.) rod. Each rod must be a minimum of 5 cm. in diameter and 1.5 meters long; however, they may be larger. The rods will be placed in three different areas of the site; preferably on cardinal compass points. Each rod will be placed into the ground in such a manner that the rod ends extend 5 cm. above the ground surface. The top end surface of each rod will be marked (by filing, cutting, burning, etc.) with an "X", as a plumb point for measurement purposes and a number (1, 2, or 3) for identification. All boundary marks, test or collection squares, diagnostic or unusual artifacts, or other measurements will be shot-in with a transit.

Materials collected from the surface will be cleaned, sorted, and tabulated at the field laboratory. Density field maps will be prepared to show concentrations of various artifact categories. These maps should indicate site boundaries and activity areas. The gathered information will be used to answer the following questions:

1. What is the surface horizontal extent and surface temporal span of the site?
2. What are the locations and boundaries of surface artifact density clusters?
3. Do different density clusters indicate different specialized activities and/or different cultural time periods?

The second purpose is to determine if the site extends under the fill materials to the edge of Ditch 19. When the fill materials reach a height of nearly 2 meters at its apex, testing becomes a problem. If concentrations of artifacts are found and they extend to the fill material, a maximum of three test trenches will be dug through the fill material to the site proper. The fill material will be removed by a bulldozer to within 30 cm. of the actual ground surface. Each trench will be the width of the dozer blade (2 meters or greater). The sides of the trench will be graded to the proper angle to meet safety requirements. The trenches will completely cut through the fill material levee. All the loose fill material will be placed on the remaining fill material and not on the surface of the site. These trenches will be located adjacent to the high concentration, then the trenches will be located at 15 meters, 50 meters, and 84 meters, east to west, from the eastern edge of the site. Subsurface test units (1 m. x 1 m.) will be placed in these trenches. The location of each subsurface unit will be located as diagramed in Inclosure 1. The remaining 30 cms. of fill material will be removed by hand in the area of the test units only. The test units will be excavated by hand in 10 cm. levels or by natural stratigraphy if evident. All materials will be screened through  $\frac{1}{4}$  inch mesh screen. Excavation will continue until two 10 cm. levels of sterile soil have been dug. One test unit (minimum 50 cm. x 50 cm.), located in the area of highest artifact concentration near the edge of Ditch 19, will be excavated to a depth of 60 cm. below artifact bearing levels in each trench. Profiles of the north or south walls of each test unit will be drawn. All test units, within the first ten meters nearest Ditch 19, will be excavated first. These excavations will provide important information about the effects of fill materials, pressures on site stratigraphy, and artifacts.

In order to have comparative data and materials, test units must be excavated within the site and away from the fill materials. Ten such units will be excavated. The location of each subsurface unit will be located as diagramed in Inclosure 1. The test units will be excavated by hand in 10 cm. levels or by natural stratigraphy, if evident. All materials will be screened through  $\frac{1}{4}$  inch mesh screen. Excavation will continue until two 10 cm. levels of sterile soil have been dug.

One test unit (minimum 50 cm. x 50 cm.), located in the area of the highest artifact concentration will be excavated to a depth of 60 cm. below artifact bearing levels in each trench. Profiles for each test unit will be drawn. Each profile will be of either the north or south wall depending on which wall best suits the continuing profile of the trenches. As the materials and information from these test units are to be used for comparison to the same type materials from beneath the fill material, care should be taken to obtain exact measurements of strata horizons. It will be of great importance to be able to compare the same cultural and/or natural levels from both areas in order to determine the effects of long-term pressure and weight on buried strata. The attitude of encountered artifacts should be closely watched (when possible) in order to determine the effects of long-term pressures on them. If a feature is encountered in a test unit, excavation will continue. However, the test unit will not be expanded without expressed permission of the Contracting Officer or his authorized representative.

These questions are to be answered:

1. What effect does the placement of fill materials on a site have on the site subsurface stratigraphy?

a. Is the stratigraphy under the fill material different from that outside the fill?

(1) Is the stratigraphy more compressed under the fill?

(2) Is the stratigraphy deformed because of the fill weight?

(3) Is the stratigraphy under the fill wetter or drier?

b. If there is stratigraphic compression beneath the fill material, is it uniform in all test areas?

2. What effect does the placement of fill material on the site have on buried artifacts?

a. Does there seem to be a greater amount of artifact breakage under the fill than on the surface?

(1) Was this artifact breakage on the original ground surface or under the original surface?

(2) Does the artifact breakage seem to have been caused by contact with equipment or because of excessive ground pressure.

b. Are the artifacts from one strata pushed into other strata because of the excessive fill weight?

c. Does there seem to be a physical or chemical change (brittleness, oversaturation, etching, precipitants, etc.) to the artifact, which is caused by excessive or too little water and chemicals interaction?

d. Are there more or less organic artifacts preserved under the fill than in the unfilled portion of the site?

Artifact and feature data (if any) from these test units will be used in conjunction with the surface collection materials to better define the site boundary, component identification and activity areas.

1. What is the horizontal and vertical extent of the site beneath the existing levee?

a. Does the site extend to the ditch edge?

b. Does the vertical site depth increase toward or away from the ditch bank?

2. What cultural components are present at the site?

a. What is the temporal span of each component?

b. What is the temporal relationship between the components?

c. Are the cultural components found on the site surface reflected in the subsurface deposits?

3. What, if any, are the relationships between each of the components and contemporary socio-cultural systems?

Soil samples will be taken from each test unit/level in which artifacts are found. If there is a sterile level between artifact bearing levels, a soil sample will also be taken from the sterile level. If features are encountered, soil and flatation samples will be taken from them.

At the end of Stage I, the site will be guarded and protected (as described by the contract scope of work) 24 hours per day by the Contractor, for a maximum of 30

days. However, the time may be shortened as directed by the Contracting Officer. Within the first 15 days after the completion of Stage I, an interim report will be developed and submitted to the Contracting Officer. This report will discuss the findings of Stage I, and detail the recommendations, alternatives, and cost estimates of the Contractor for Stage II work. After the report is submitted, the decision to start Stage II or Stage III work will be made and the Contractor informed. If it is found that the site extends into the 8 meter direct impact zone at the ditch edge, Stage II will commence. If the site does not extend into the 8 meter impact zone, Stage II will not be implemented and the project will go directly to Stage III.

If Stage II is required, the following work will be completed. The 8 meter wide area that is to be removed, will be cleared of all the fill materials and, if it still exists, the plow zone. These materials will be removed with mechanical equipment. All fill material will be placed on the existing levee and not on the site. All exposed subsurface features will be systematically excavated. All features will be photographed and mapped, and feature material will be fine screened through 1/32 inch mesh screen. The field laboratory will continue to operate and process artifacts.

Soil samples will be taken from each feature for possible pH and/or phosphate tests and possibly pollen samples. Pollen samples will be used in an attempt to provide a pollen profile for the site at a specific time period. Also pollen samples will establish a guide to plants and plant foods found in this area. These samples will be used to determine the introduction of, and dependence on, corn.

When possible, radiocarbon samples will be taken. If numerous samples are taken, they will be processed in priority to their associations and potential archeological value for dating components, occupations, and features.

Faunal remains will be drawn, mapped, and photographed before being removed from the features. These will be processed in the laboratory, and an attempt made to

identify them. This information will be used to determine types of animal food resources, changes in subsistence patterns through time, possible domestication, and the introduction of European animals. This information will answer such questions as:

1. What natural resources were selected for food?
  - a. How important was Prairie exploitation to each component?
  - b. How important were upland resources to each component?
  - c. How important were lowland resources to each component?
  - d. How important were deer, raccoon, turkey and dog as food resources to each component?
2. What, if any, cultigens and domesticated animals were utilized?
  - a. What native cultigens were used?
  - b. Were cultigens brought in from other non-European sources?
  - c. Is there evidence of salt production from plants in any of the components?
  - d. Is there evidence of corn horticulture in any of the components?
  - e. Does the dependency on corn agriculture increase through time?
  - f. Is there indication of the use of European cultigens and/or domesticated animals by the native population?
3. How did the subsistence pattern change through time? If so, what caused these changes?
4. Do the subsistence resources indicate seasonal or permanent settlements?

If human remains are encountered, they will be drawn, mapped, and photographed before being removed from the feature. The remains will be analyzed in an attempt to determine age, sex, stature, and disease and nutrition patterns. If burials are numerous, (which we don't expect), an attempt will be made to determine the group population size.

1. What was the orientation of each burial?
  - a. What was the head direction of the burial?
  - b. In what position (flexed, extended, sitting, etc.) was the burial?
  - c. What artifacts were found with each burial?
2. What are the physical characteristics of the burials?
  - a. What physical characteristics were different between burials from different components?

- (1) Are there indications of cranial deformation?
  - (2) Was the cranial deformation in the front or back of the head?
- b. What is the sex of each burial?
  - (1) Are male burials more predominant than female burials?
    - (a) Does this vary between components?
- c. At the time of death, what was the estimated age of each burial?
  - (1) What seemed to be the average death age for each component?
  - (2) What was the average death age for men, women, and children?
- d. What was the stature of each burial?
  - (1) What was the average male and female stature for each component?
  - (2) Was the average stature greater or smaller than that from other sites?
- e. What diseases are indicated by the burials?
  - (1) Were the diseases the same for all components?
  - (2) Were any of the diseases related to nutrition?
  - (3) Were any of the diseases sex related?
- f. Are there indications of contact with European diseases?
- 3. Is there evidence of burial ceremonialism?
  - a. Which cultural component seems to have the most elaborate burial ritual?
  - b. What type grave goods were found with the burials?
    - (1) Were more burial goods left by one component than another?
    - (2) How did the burial goods for men, women, and children vary?
      - (a) How did the arrangement of these goods vary?
      - (b) Do any of these associations indicate social stratification or status differential?
  - c. Is there evidence of secondary reburial?
  - d. Is there evidence of European style burial?
- 4. Were the burials associated with houses or other features?
  - a. How did this vary with each component?
  - b. Were the associations intentional or by chance?
  - c. Do any of these associations indicate social stratification or status differential?
- 5. Is it possible from the number of burials found to make a population estimate for each component?

6. How does the physical, ritual, and burial information compare to that obtained for corresponding cultural components at other sites in the region?

Surface elevation contour maps of the site will be made using a transit, stadia rod, and measuring tapes. All measurements will be in the metric system. Surface collection data maps, test pits, and feature data maps will be correlated and compared with the topographic map. An attempt will be made to correlate cultural activities with natural features and to document, if possible, the movement of artifacts to areas of erosion. All measurements will be tied-in to one, or all three, of the metal plumb datum posts.

Ceramic analyses will focus on typological characteristics (decoration and temper) and component definition at the site. Vessel shape (projected), size, temper, and paste will be used to check for differences between site components. This will determine if there is in-site development, from one component to another. Vessel size and shape may indicate use, group size, and manufacturing technology. Radiocarbon dating, stratigraphy, contextual associations, decorative motifs, and technical developments may provide an insight to the development of ceramics from component to component. This information may provide answers to the following questions:

1. Were ceramics found in all components?
2. Can a ceramic typology be developed on the basis of decoration and temper?
  - a. Do different components and/or phases use different decorative motifs?
  - b. Do different components and/or phases use different temper?
3. Are there indications of "in situ" ceramic manufacturing?
  - a. Does "in situ" ceramic manufacturing appear in each component and phase?
  - b. What manufacturing techniques were used in each component?
4. Does vessel size and/or shape mark the differences between each component and/or phase?
5. Can the functional variability in the assemblages indicate what activities were carried out within the various occupations?
6. What relationships are shown from a comparison of the ceramic artifacts collected from the surface and those recovered from subsurface testing?
  - a. Are the same site functions and/or activities represented, based on the two collections, independent of one another?



- b. Are the same components represented in both collections?

Component identification and relationships will be studied through the analysis of diagnostic points and tools. Raw materials, manufacturing processes, typologies and uses will be studied in detail. Both macroscopic and microscopic studies of wear patterns will be used to classify tools as to probable use. Raw materials and manufacturing techniques will be used to compare components and explain variability. This information will provide an indication of the activities carried out within various occupations.

The study of local and exotic raw materials will provide an insight into the varieties of these materials within specific components, specific tool forms, specific uses, manufacturing techniques, and trade. When possible, heat treatment of raw materials will be documented. It is expected that the major supply of raw chert will be from Crowley's Ridge. Minor exotic cherts and sandstones will come from the Ozark Plateau and the Crescent Quarry area from near St. Louis. It is expected that other, more exotic raw materials, from other locations, will be found. The study of raw materials may provide answers for the following questions:

1. What were the raw materials and their sources?
  - a. Were lithic raw materials brought in rough or as preforms?
  - b. Were lithic raw materials for each component the same or different?
  - c. Are there any exotic raw materials?
    - (1) What are the probable locations of the exotic raw materials?
    - (2) Were the exotics brought in rough or as preforms?
  - d. Do lithic artifact classes vary according to raw material types?
  - e. Were ornamental raw materials local or exotic?
2. Are there indications of heat treating rough materials?
  - a. Were all rough materials heat treated?
  - b. Were only selected types of lithic raw materials heat treated?
3. What is the basic artifact assemblage for each component?
  - a. Can diagnostic artifacts be used to identify each component?
  - b. Can diagnostic artifacts be used to explore phase relationships and breaks in time?
  - c. Can a typology be established?
4. What are the functional variabilities represented within the lithic assemblage?

a. Can these variations be used to determine what activities were carried out within the various occupations?

b. Is there evidence of groundstone technology in any or all of the components?

c. Is there evidence of a lapidary industry technology in any or all of the components?

5. Did lithic artifact classes vary according to manufacturing techniques?

a. What types of manufacturing techniques were used?

b. Did lithic artifact classes and manufacturing techniques differ from component to component?

6. What relationships can be drawn from a comparison of the lithic artifacts collected from the surface and those recovered during testing?

a. Are the same site functions and/or activities representative, based on the two collections independent of one another?

b. Are the same components represented in both collections?

Analysis of materials and correlation of information will continue into and be completed in Stage III. More general questions that relate to the regional and area site relationships will be asked and answered. Of prime importance will be an attempt to relate the past regional environment with site specific and site regional settlement strategies. This information will relate to the following questions:

1. What was the general nature of the past regional environment?

2. What detailed characteristics of each component are found in past microenvironments?

a. How did local landforms relate to these environments?

b. How did the local biotic communities relate to these environments?

c. How did the local soil associations relate to these environments?

d. How did landforms, biotic communities, and soil associations determine the natural parameters within which this settlement strategy had to operate?

e. How did it help determine associations with other sites within the same time period and region?

3. What was the adaptive ecological microcosm for each of the components?

4. What factors (environmental, geomorphological, biotic, technological, etc.) helped determine this site location for each component?

a. How does this site and these factors relate to other sites in the local area?

- b. Are all the factors the same for each site?
- 5. What soil type is the site located on?
  - a. What is the distribution and size of known sites in this area that are on the same soil type?
  - b. What is the anticipated distribution of sites in this area that are on the same soil types?
  - c. What type of land forms are generally associated with this soil type?
  - d. How are the basic soil types associated within the local catchment areas?
- 6. Were each of the components site seasonal, year-round, or permanent?
  - a. If seasonal, at what season was the site occupied?
  - b. What floral, faunal, and artifactual remains indicate this?
- 7. What was the site function for each component?
  - a. What range of activities are represented?
  - b. Are there indications of palasading in any of the component areas?
- 8. Are house patterns evident?
  - a. How do the house patterns vary from each component?
  - b. How do the house patterns from this site compare with sites of equal culture and age from other areas?
  - c. What type of interior living arrangements are indicated from the living floor?
    - (1) Was cooking done inside the house?
    - (2) Were there areas that seemed to be used for some type of work (flint snapping, lapidary, etc.)?
  - d. Do artifactual remains within the house indicate a division of labor?
    - (1) What artifacts are indicative of the division of labor?
    - (2) Are the same labor division indicators present at other local sites?

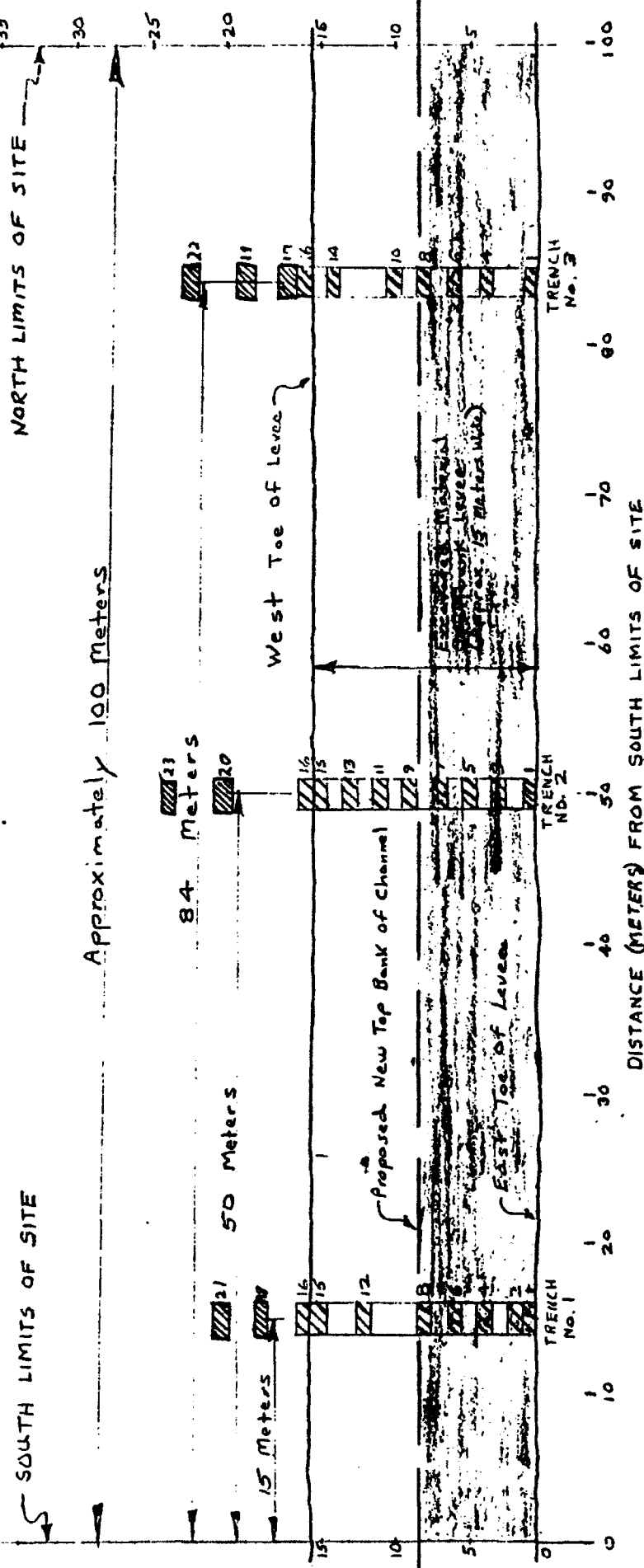
An attempt will be made to determine if contemporary sites of the region traded with each other. Normally, specialization is difficult to detect, especially when so little of the site is scientifically excavated. Tools, ceramic decorative motifs, and raw materials will be examined in an attempt to determine any specialization. An attempt will be made to answer the following questions:

1. Is there evidence of imported materials (styles, motifs, exotic raw materials, etc.) in any of the components?
  - a. Do ceramic styles and/or decorative motifs indicate an outside influence?
  - b. Are ornaments made from exotic materials?
    - (1) Are there indications that ornaments were made on the site, or before their arrival at the site?
    - (2) Are the preforms present or rough materials?
  - c. Are similar exotic materials and items found at other contemporary sites in the area?
2. Do any tools show functional modification for working the raw materials?
3. Are there indications of a lapidary industry at this site?
  - a. Are all ornaments found in a completed form?
    - (1) Were blank forms found?
    - (2) If blank beads or pendants were found, were they drilled?
  - b. Were possible manufacturing areas indicated?
    - (1) Were manufacturing tools found?
    - (2) Was manufacturing trash found?
4. Are the ornaments like those found at other sites?

At the conclusion of Stage III, a technical and popular draft report (as described in the project scope of work) will be submitted to the Memphis District. After a review of the draft and corrections of any deficiencies in the report, a final technical and popular (in conventional layman's language) report will be submitted to the Memphis District Corps of Engineers.

NOTE:

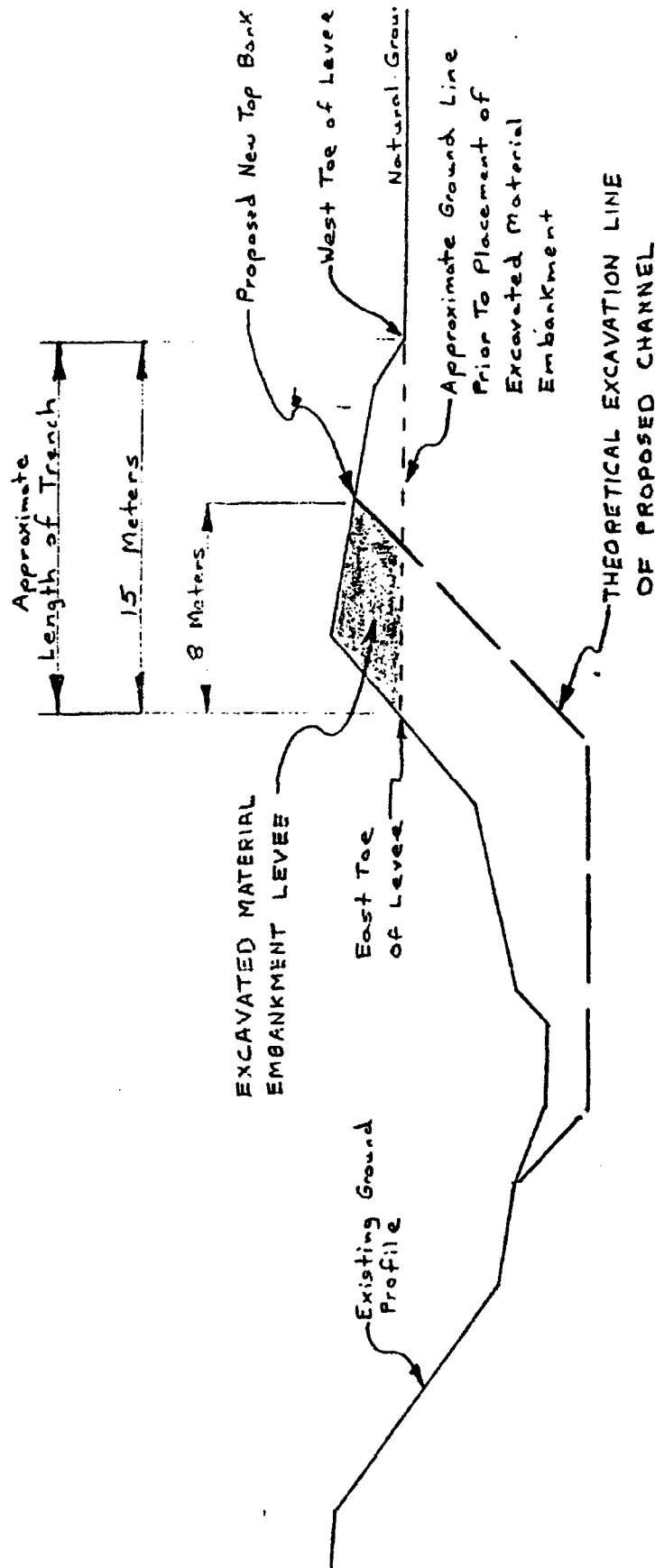
The Length of the Site and Width of the Spoilbank Levee Shown on the Plan Were Obtained From Preliminary Investigations. If Actual Dimensions are Different, the Locations and Plan for Excavation of the Trenches May Be Altered By the Contracting Officer.



Flow  
(Ditch 19 Channel)

ARCHEOLOGY SITE 23DU227  
TRENCH EXCAVATION PLAN

LEGEND  
 [Symbol] Test Pit  
 [Symbol] Distance (Meters) From East Toe of Levee  
 [Symbol] Portion of Levee To Be Removed During Channel Construction



## TYPICAL CROSS SECTION

### LEGEND



Portion of Excavated Material  
Embankment Levee Within  
Limits of Proposed Excavation  
of New Channel

Site 23DU227

## **APPENDIX B**

### **Description of Chipped Stone Artifacts**

## INITIAL REDUCTION

Cores (20 specimens) - These are multi-faceted, irregularly shaped lithic artifacts of various sizes. They are characterized by random removal of large, broad flakes. None showed evidence of use. All of the cores were manufactured from Crowley's Ridge materials: 4 heated chert; 14 unheated chert; and 2 quartzite.

## PRIMARY FLAKING

Bifaces (20 specimens) - Primary uses of these artifacts were cutting, sawing, and slicing/carving. Minor uses included planing and adzing. Three specimens showed no use, and two specimens are of indeterminate use. Ten specimens are heat treated Crowley's Ridge chert, and ten specimens are unheated Crowley's Ridge chert. Nine specimens are shaped ovoid, two are triangular, one is rectangular, one is rounded, one exhibits evidence of having been hafted, and six are biface fragments.

Unifaces (4 specimens) - Uses include slicing/carving, chopping, and indeterminate use. Two are shaped ovoid, one is triangular, and one is rectangular. Two specimens are unheated Crowleys Ridge, and two are quartzite.

Uniface/biface (1 specimen) - This specimen has unifacial flaking on one side and bifacial flaking on the opposite side. It exhibits use by chopping and is unheated Crowley's Ridge chert.



Marginally modified flakes (24 specimens) - Uses exhibited include cutting, sawing, slicing/carving, scraping, planing, and whittling. Three of the specimens exhibit multiple functions. Nine specimens are heat treated Crowley's Ridge chert, and 15 are unheated Crowley's Ridge chert.

Unidentified Chipped Stone (1 specimen) - This specimen exhibited no evidence of use and was made from heat treated Crowley's Ridge chert.

Wedge (1 specimen) - This specimen exhibits use as a woodworking tool and is unheated Crowley's Ridge chert. Cobble cortex is present on the non-working surfaces.

## SECONDARY FLAKING

Biface Fragments (3 specimens) - All three secondary flaking biface fragments were manufactured from Crowley's Ridge materials. One is unheated Crowley's Ridge chert, another is heated Crowley's Ridge chert, and the third is quartzite. The quartzite fragment is a distal fragment, bi-convex in cross section. The heated chert appears to be a rounded, plano-convex proximal fragment. The unheated Crowley's Ridge fragment is a white chert flattened in cross-section. Each exhibits different use-wear: cutting, sawing, and slicing/carving.

Drills (2 specimens) - Both were manufactured from local raw materials, i.e., Crowley's Ridge chert, and neither exhibits heat alteration. Both are surface finds. One drill has an expanding base, and is 4.3 cm long, 1.3 cm wide at the base, and 0.8 cm thick. The other drill is a shaft drill with the tip broken. It is 1.4 cm wide and 0.8 cm thick. Both are bi-convex.

## Projectile Points

Big Sandy Notched (1 specimen) - This specimen was made from heated Crowley's Ridge chert. It has an obtuse distal end with an excurvate blade. The shoulders are asymmetrical with one rounded and one tapered. The base is expanded, and the cross-section is plano-convex. The point is 5.2 cm in length; the shoulders are 3.1 cm in width; the base is 2.6 cm in width, and the point is 0.75 cm thick (see Figure 28f). According to Chapman (1975:242), the Big Sandy Notched is dated 5,000 to 500 B.C.

Gary (1 specimen) - This specimen was made from unheated Crowley's Ridge chert. It has an acute distal end with a straight blade. The shoulders are asymmetrical with one rounded and one tapered. The base is straight and the cross section is bi-convex. The point is 4.6 cm in length; the shoulders are 2.1 cm. in width; the base is 1.4 cm in width; and the point 9.8 cm thick (see Figure 28b). According to Cambron and Hulse (1975:57), the Gary projectile point is associated with the later Archaic to Woodland periods.

Motley (1 specimen) - This specimen was made from heat treated Crowley's Ridge chert with quartzite inclusions. It has an acute distal end with a straight blade. The shoulders are asymmetrical with one horizontal and one tapered. The stem is expanded and formed by broad deep side notches. The base is slightly auriculated and expanded, and the cross-section is plano-convex. The point is 3.25 cm in length; the shoulders are 1.5 cm in width; the base 151.4 cm in width; and the point is 0.6 cm thick (see Figure 28a). According to Cambron and Hulse (1975:92), the Motley point has a strong early Woodland association with a beginning in Archaic times.

Indeterminate (1 specimen) - This specimen was made from heat treated Crowley's Ridge chert. It is similar to Flint Creek points, found further southeast, having an acute distal end with one straight blade edge and one excurvate blade edge. The shoulders are asymmetrical with one being rounded and one horizontal. The stem is straight, the base is unfinished, and cortex is remaining on the surface. The cross-section is bi-convex. The point is 5.1 cm in length; the shoulders are 2.4 cm in width; the base is 1.2 cm in width; and the point is 0.9 cm thick (see Figure 28g). According to Cambron and Hulse (1975:51), Flint Creek is associated with late Archaic to early Woodland periods.

Indeterminate (1 specimen) - This specimen was made from unheated Crowley's Ridge chert. It is similar to Ledbetter points and has an acute distal end and straight blade edges. The shoulders are asymmetrical with one barbed and one inversely tapered. The stem is slightly expanded and has straight edges. The base is straight, and the cross-section is bi-convex. The point is 4.7 cm in length; the shoulders are 3.1 cm in width; the base is 1.9 cm in width; the point is 9.9 cm thick (see Figure 28e). According to Kneberg (1956) in Cambron and Hulse (1975:78), Ledbetter points date from about 2000 B.C. to early centuries A.D.

Indeterminate (1 specimen) - This specimen was made from unheated Crowley's Ridge and exhibits a distinct greyish-tan patination. It has an acute top and a broad blade with excurvate edges. The shoulders are asymmetrical and inversely tapered. The stem is broken at the shoulders, and the stem and base were not recovered. The point is 4.8 cm in length; the shoulders are 4.35 cm in width; the base is 2.3 cm in width at the point of the break; and the point is 0.8 cm thick (see Figure 28d). Although the stem is

broken, corner notching is discernible and thus indicates a late Archaic to Woodland period association.

Indeterminate (1 specimen) - This specimen was made from unheated Crowley's Ridge chert. It has an acuminate distal end and excurvate blade edges. The shoulders are tapered and formed by shallow side notches as is the straight base. The point is 3.7 cm in length; the shoulders are 2.0 cm in width; the base is 1.98 cm in width; and the point is 0.6 cm thick (see Figure 28c). The presence of side notching indicates an association with the late Archaic to Woodland periods.

Recycled Projectile Point Base (1 specimen) - The raw material of this specimen has been tentatively classified as unidentified. It is a red and brown banded chert which may be a form of Crowley's Ridge. The stem is expanded. The shoulders have been reworked. The point was broken transversely where the shoulders and base meet. The broken edge has been reshaped, but shows no evidence of use.

Projectile Point Bases (4 specimens) - All were manufactured from Crowley's Ridge, and two have been heat treated. One has heat spalls, and it has only a portion of the stem and one shoulder remaining. It is bi-convex in cross-section. Two bases have contracting stems with only one shoulder present; one is tapered and plano-convex in cross-section, and the other is horizontal with a biconvex cross-section and is heat treated. The fourth base fragment has a thinned, excurvate stem with no shoulders or blade remaining and is bi-convex in cross-section.

## **APPENDIX C**

### **Glossary**

- Adzing - transverse motion resulting in unifacial scarring and striations perpendicular to the edge.\*
- Boring - roughened tip, scarring, emanates from top, twisting results in removals from the lateral edges leading to the point.\*
- Chert - a siliceous mineral, is formed by a process of silica precipitation or percolation and subsequent accretion. Chert occurs in nodules or beds in sedimentary rocks such as limestone.
- Chopping - usually bifacial, when assymetrical the damage tends to favor one side over another. The heavy impact of chopping results in scars with well defined hinged and stepped terminations - striations oblique to the cutting edge.\*
- Crowley's Ridge - gravels  
Crowley's Ridge gravels consist of quartzite and chert cobbles often greater than 15 cm in diameter. The cortex of these cobbles is generally brown, reddish-brown, or greyish-brown and often smooth. The interior of the chert cobbles varies in color with brown, tan, greyish tan, yellowish tan, and cream-colored beige common colors. Mottling and banding of colors occurs with mottling being more frequent than banding. The quartzite cobbles are largely a translucent grey or yellowish tan on the interior (House 1975b).
- Cutting - flake scars are on both edges and alternate from side to side developing with use into denticulation of the lateral margin. If striations are visible they are near and parallel to the edges. If the margin is rounded from use, abrasions are first evident on projections and later on extensive contiguous areas of the margin.\*
- Planing - scarring is unifacial and usually covers a wide area. Visible striations are perpendicular to the edge on the surface opposite the scarring. Abrasive wear is extensive on the surface in contact with the worked material.\*
- Projectile - exhibits all size removals with sharply defined terminations that resemble burin spall negatives. Striations visible are parallel to the long axis of the piece or the short axis if the piece is shafted transversely, and occur both away from and close to the edge.\*
- Quartzite - this rock is generally formed when a quartz sandstone undergoes pressure and thermal metamorphism. In available pores spaces recrystallization with silica occurs and grain boundaries are reformed. Sedimentary quartzite is quartzite which has not had the grain boundaries recrystallized.
- Sawing - sawing follows the description given for cutting with the exception that wear patterns are not uni-directional.\*

- Scraping - scarring is located more on one surface than the other and visible striations are often unifacial and usually slanted, or diagonal to the edge.\*
- Wedging - usually bifacial, when asymmetrical the damage tends to favor one side over another. The heavy impact of wedging results in scars with well defined hinged and stepped terminations - striations perpendicular to the cutting edge. The opposite end exhibits pitting or chipping marks.\*
- Whitling - exhibits predominantly unifacial removals with little evidence of crushing.\*

\* from Odell and Odell-Vereecken (1980). Additionally, these definitions are based on use and wear patterns rather than function.

## **APPENDIX D**

### **Gross Counts of Artifact Categories by General Provenience at Site 23DU227**



Table 13. Gross counts of artifact categories by general provenience at site 23DU227

	Units													Total
	CSC	A	B	C	D	E	G	M	O	P	Q	Z	EE	
Chipped Stone	50	3	17	2	1	3	-	-	-	-	-	-	12	88
Debitage	1189	115	265	201	12	112	1	-	-	2	3	1	327	2228
Prehistoric Ceramics	43	2	41	1	1	-	-	-	-	-	1	-	90	179
Historic Ceramics	45	-	-	2	-	1	-	-	-	-	-	-	3	51
Historic Glass	315	-	1	6	5	1	-	-	-	-	-	-	17	345
Historic Metal	107	-	-	4	6	10	-	1	-	-	-	-	22	150
Historic - other	9	-	-	-	-	-	-	-	-	-	-	-	1	10
Fire-Cracked Rock	501	87	278	92	3	32	-	-	3	2	2	1	441	1442
Chunk/shatter	101	29	116	5	2	10					3	-	200	466
Fired Clay	1						-	-	-	-	-	-		
Total	2361	236	218	313	30	169	1	1	3	4	9	2	1113	4960

## **APPENDIX E**

### **Pollen and Phytolith Analysis of Sediments From 23DU227, Southeast Missouri**

**By**

**Linda J. Scott, M.A.  
and  
Rhoda O. Lewis  
Palynological Analysts  
Montrose, Colorado**

## INTRODUCTION

Site 23DU227, located in Dunklin County, southeastern Missouri, is situated in a present-day soybean field. The area surrounding the site includes, in addition to the fields, a man-made irrigation ditch (Ditch 19) and Crowley's Ridge, which is covered with an oak-hickory complex. This forested ridge supports an assortment of broadleaf trees including white oak, northern red oak, chinquapin oak, walnut, butternut, beech, tulip tree, cucumber tree, basswood, and cedar. The ridge is currently surrounded by fields in which soybean and corn crops are rotated. Lumbering activities in the late 1800s and early 1900s cleared the formerly forested area of black walnut, cottonwood, willow, sassafrass, hackberry, boxelder, pawpaw, hickory, and several varieties of oak (Jeyne Bennett, personal communication, September 1983). Pollen and phytolith analyses were undertaken at this site to evaluate the prehistoric environment and to assist in the determination of site significance.

## METHODS

The pollen was extracted from soil samples submitted by Environment Consultants, Inc. from 23DU227. A chemical preparation based on flotation is the standard preparation technique used in this laboratory for the removal of the pollen from the large volume of sand, silt, and clay with which they are mixed. This particular process was developed for extraction of pollen from soils where preservation has been less than ideal.

Hydrochloric acid (10%) was used to remove calcium carbonates present in the soil, after which the samples were screened through 150 micron mesh. Zinc bromide (density 2.0) was used for the flotation process. All samples received a short (10 minute) treatment in hot hydrofluoric acid to remove any remaining inorganic particles. The samples were then acetolated for 3 minutes to remove any extraneous organic matter.

A light microscope was used to count the pollen to a total of 200 pollen grains at a magnification of 430x. Pollen preservation in these samples varied from fair to poor. Comparative reference material collected at the Intermountain Herbarium at Utah State University, the University of Colorado Herbarium, and from the Oklahoma Geological Survey was used to identify the pollen to the family, genus, and species, level, where possible.

The phytoliths were extracted from the same soil samples taken from 23DU227 that were analyzed for pollen. The extraction procedures are based on those reported by Lewis (1979). This process, too, is centered on a flotation process utilizing a heavy liquid. Fifty grams of soil are weighed and dissolved in a beaker containing hydrogen peroxide to destroy any organic materials present. The samples are agitated with Calgon after settling for 24 hours, and then sieved through a USA Standard Testing Sieve 279 (53 microns), after which the clay particles are separated and discarded by centrifuging the sample with distilled water. The remaining silt portion of the sample is then dried. One gram of dried silt is then mixed with zinc bromide (density 2.3) and the mixture centrifuged at 3000 rpm. The phytoliths and other light materials are decanted, filtered, and washed several times with distilled water, then permanently mounted on slides with glycerine jelly for examination.

Three transects on each specimen slide were examined at a magnification of 450x. This constitutes examination of approximately 7% of the entire slide. With the exception of Elongate type phytoliths, which are present in all plants, the phytolith types were identified and counted.

## DISCUSSION

A control sample was selected from the upper stratigraphic level (Stratum A), approximately 5-12 cm below the surface, to determine modern deposition of pollen and phytoliths. Three pollen and phytolith samples were also examined from the cultural level (Stratum B) from Units A, C, and D (Table 14). These three samples representing the cultural stratum were selected for analysis from a total of 5 samples submitted from the cultural stratum on the basis of preservation in the individual samples. Areas A, B, C, D, and E were represented in the test samples.

The pollen count of the control and cultural samples does not differ significantly (Figure 30). The oak-hickory complex now present only on Crowley's Ridge is reflected in the control pollen sample, albeit in lower frequencies than in the cultural stratum. The reduction in arboreal pollen frequency in the control sample (16%) compared to the samples from the cultural stratum (25-34%) reflects the historic clearing of this previously forested area. Low-spine Compositae (ragweeds) and Graminae (grasses) (Table 15) are the non-arboreal pollen types that have increased significantly in the control sample over frequencies noted in the samples from the cultural stratum.

Table 14. Provenience of pollen and phytolith samples from 23DU227

Sample	Stratum	Depth below pgs in cm	Unit	Pollen Counted	Phytoliths Present
<u>Pollen</u>					
1	A	5-12	A	200	
2	B		A	100	
3	B		B	No	
4	B		C	100	
5	B		D	200	
6	B		E	No	
<u>Phytoliths</u>					
1	A	5-12	A		Yes
2	B		A		Yes
3	B		B		Rods only
4	B		C		Yes
5	B		D		Yes
6	B		E		Rods only



Table 15. Pollen types observed at 23DU227

Scientific Name	Common Name
<b>ARBOREAL POLLEN:</b>	
<u>Acer</u>	Maple
<u>Acer negundo</u>	Boxelder
<u>Alnus</u>	Alder
<u>Asimina</u>	Pawpaw
<u>Carya</u>	Pecan
<u>Celtis</u>	Hackberry
<u>Juglans</u>	Walnut
<u>Juniperus</u>	Cedar
<u>Liquidambar</u>	Sweetgum
<u>Picea</u>	Spruce
<u>Pinus</u>	Pine
<u>Quercus</u>	Oak
<u>Salix</u>	Willow
<u>Ulmus</u>	Elm
<b>NON-ARBOREAL POLLEN:</b>	
Caprifoliaceae	Honeysuckle family
cf. Symphoricarpus	Snowberry
Caryophyllaceae	Pink family
Cheno-ams	Includes amaranth and pigweed family
Compositae	Sunflower family
<u>Artemisia</u>	Sagebrush
Low-spine	Includes ragweed, marsh elder, etc.
High-spine	Includes sunflower and others
Liguliflorae	Includes dandelion and chickory
Cruciferae	Mustard family
Cyperaceae	Sedge family
<u>Eriogonum</u>	Buckwheat
<u>Geranium</u>	Wild geranium, cranesbill
<u>Graminae</u>	Grass family
<u>Ilex</u>	Holly
<u>Labiatae</u>	Mint family
<u>Leguminosae</u>	Pea family
<u>Liliaceae</u>	Lily family
<u>Polygonum</u>	Smartweed
<u>Rosaceae</u>	Rose family
cf. <u>Vitis</u>	Grape
<u>Urtica</u>	Nettle
<u>Zea</u>	Corn



The oak-hickory complex is also reflected in the pollen record from the cultural stratum. The variety of pollen from broadleaf trees observed in samples 2, 4, and 5 from the cultural stratum is typical of pollen records from pollen records from oak-hickory associations in southern Oklahoma (Albert 1981).

A small quantity of relatively modern pollen appears to have mixed with the pollen in the cultural stratum. This is evidenced by occasional pollen grains that do not display any significant deterioration and also by the presence of Zea pollen in Sample D. As noted previously, corn (Zea) and soybean crops have been rotated in the fields of this area. Leguminosae pollen, probably soybean pollen, was noted in the control sample, although Zea pollen was not. Pollen samples from modern agricultural fields indicate that Leguminosae pollen is only rarely noted, if at all (Scott 1981:15), and Zea pollen may be present in low frequencies (Martin and Byers 1965:128).

Phytolith analysis of soil from the cultural level and the upper control yielded evidence of Panicoid or dumbbell-shaped phytoliths exhibiting large size variation. A moist climate supporting tall and moist grasses is evidenced in the three samples from the cultural stratum (Stratum B). The samples from Units A and D are similar to one another, while the sample from Unit C exhibits a radical increase in Festucoid phytoliths, perhaps indicating an activity area or local variation in vegetation (Table 16). The sample taken from Unit D (sample 5) also contained a large number of diatoms, indicating a moist situation. Sample 5 also contained 12 phytoliths that resemble a conifer type which Rovner (1971:350, figure 1h) described as having netting-like fragments, and attributed to Larix (larch).

Table 16. Classes of phytoliths present in samples from 23DU227

Sample No.	Festucoid	Chloridoid	Panicoid	Elongate
1	19	6	36	Abundant
2	16	1	22	180
4	105	9	108	246
5	23	4	23	101

The control sample taken from the upper level (Stratum A) in Unit A contained three phytoliths that could definitely be attributed to Zea mays (corn), and eleven additional phytoliths that are probably from corn. All of these phytoliths contained occluded carbon. Diatoms were also present in this sample, indicating a moist environment.

#### SUMMARY AND CONCLUSIONS

Pollen and phytolith analysis at 23DU227 suggests that the environment during the occupation of the site was much like that recorded prior to the historic clearing of the area. The vegetation appears to have been dominated by broadleaf trees and grasses, forming an open canopy or forest interspersed with grassy areas. The mixing of pollen evident in the samples from the cultural stratum appears to result from historic disturbance, probably cultivation. Corn pollen was introduced into the cultural stratum in Unit D from cultivation of the field prior to the excavation season. This mixing within the pollen record indicates that while general observations concerning the paleoenvironment may be made, this site does not exhibit enough integrity for detailed interpretation of the paleoenvironment, nor for the interpretation of activity areas within the site.

## REFERENCES CITED

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1981 Ferndale Bog and Natural Lake: Five Thousand Years of Environmental Change in Southeastern Oklahoma. Studies in Oklahoma's Past. No. 7. Oklahoma Archeological Survey. Norman.
- Lewis, Rhoda O.  
1979 Use of Opan Phytoliths in Paleo-environmental Reconstruction. M. A. Thesis, University of Wyoming. Laramie.
- Martin, Paul S. and William Byers  
1965 Pollen and Archaeology at Wetherill Mesa, IN Contributions of the Wetherill Mesa Archaeological Project, Assembled by Douglas Osborne: 122-135. Society for American Archaeology Memoir 19.
- Rovner, Irwin  
1971 Potential of Opan Phytoliths for Use in Paleoecological Reconstruction. Quaternary Research 1:343-359.
- Scott, Linda J.  
1981 Pollen Analysis in Selected Rooms at Walpi and Along Modern Transects Near First Mesa. Part II in Walpi Archaeological Project Phase II, Vol. 7: Archaeobotanical Remains from Walpi. By Robert E. Gasser and Linda J. Scott. Museum of Northern Arizona.

## **APPENDIX F**

### **Vitae of Key Personnel**

## VITA

Jeyne Bennett

### Personal:

Date of Birth	July 1, 1954
Place of Birth	Bryan, Texas
Status	Single

### Fields of Interest:

Artifact preservation/management, cultural resource management, Southeast U.S archaeology, historical archaeology, prehistoric ceramic technological studies.

### Education:

B.A.	Anthropology/History	Mississippi State University	1975
M.A.	Anthropology	University of Arkansas	1980

### Employment:

#### Research/Administration

Jan. 1981 present	Laboratory Director, Environment Consultants, Inc. - major responsibility is to coordinate laboratory work (processing and analysis) for archaeological projects - supervise lab crews in and out of field - arrange for specialized analyses of ecofactual artifacts - write laboratory results.
Oct.-Dec. 1980	Survey Archaeologist, Ft. Campbell Military Reservation, University of Kentucky-conducted survey, worked with site maps and site forms.
May-Oct. 1980	Laboratory Research Assistant, Tombigbee Historic Townsites Project, Michigan State University - processed and analyzed historic artifacts - taught historic artifact identification to incoming lab personnel - organized and supervised analysis of 2 sites -analyzed the prehistoric lithic and ceramic artifacts found in association with work on this project.
Jan.-May 1980	Laboratory Team Leader, Tombigbee Midden Mound Project, University of West Florida - did intensive analysis of prehistoric lithic and ceramic artifacts - this involved placement of these artifacts into functional and typological categories - also made

determination of chert types -worked with macrobotanical collections - taught lab crew lithic and ceramic identification for sorting - wrote the project's sorting procedures for ceramics which was placed in a lab manual.

- Aug.-Dec. 1979 Laboratory Research Assistant, Felsenthal National Wildlife refuge in southeast Arkansas, Arkansas Archeological Survey - managed the field lab - organized, supervised, and performed processing and analysis of the prehistoric ceramic and lithic artifacts - worked with maps on site location - carried out administrative duties, project accounting, equipment inventory and storage, business details, obtaining and assigning accession numbers, and artifact storage - wrote daily interpretations on the artifacts for use in site determinations.
- May-Aug. 1978 Laboratory Supervisor, Toltec Indian Mounds State Park in Scott, Arkansas, Arkansas Archeological Survey - organized and supervised lab crews for the regular excavation, field school, and amateur training program - trained personnel for these crews -taught lab processing and analysis classes - wrote cultural assessments for crew chiefs - drafted and maintained lab copies of field maps -established lab procedures for this setting-up phase of the project.
- July-Aug. 1977 Laboratory Assistant, Tibbee Creek Site, Mississippi State University - supervised lab crews, instructed field school labs in prehistoric artifact analysis - processed and analyzed prehistoric lithic and ceramic artifacts - organized and wrote lab procedures.
- 1975-1977 Laboratory and Field Archaeologist, Mississippi State University - participated in several archaeological projects which involved excavating, mapping, processing, and analyzing.

#### Teaching

- 1979-1979 Teaching Assistant, University of Arkansas.

#### Professional Organizations:

Society for American Archaeology  
American Anthropological Association  
Society of Historical Archaeology  
Arkansas Archeological Society  
Phi Alpha Theta

#### Professional Experience:

- 1981-1983 Laboratory Director with Environment Consultants, Inc., Dallas, Texas, conducted artifactual analysis on artifacts from Arkansas, Idaho, Mississippi, Missouri, New Mexico, and Texas.

- 1980 Archaeological Investigations at Fort Campbell Military Reservation, Kentucky; Tombigbee Historic Townsites Project, Mississippi, Tombigbee Midden Mound Project, Mississippi.
- 1979 Archaeological Investigations at Felsenthal National Wildlife Refuge, Arkansas.
- 1978 Archaeological Investigations at Toltec Indian Mounds State Park, Arkansas.
- 1977 Archaeological Investigations at Tibbee Creek Site, Lauderdale County and Tishomingo County, Mississippi.
- 1976 Archaeological Investigations at Tibbee Creek Site, Mississippi.
- 1975 Archaeological Investigations of Oktibbeha County and along the Tennessee-Tombigbee Waterway, Mississippi.

Publications:

- 1975 (with Don Robertson) Site distributions In An archaeological site survey in central Oktibbeha County, Mississippi: June-July 1975, pp. 12-26, ed. Crawford H. Blakeman, Jr. Mississippi Archaeology X(9).
- 1981 Sections In Cultural resources survey of the Troup Mine, Texas. Report submitted to EXXON Coal, U.S.A., Inc., Houston, by Environment Consultants, Inc., Cultural Resources Report 81-6.
- 1981 (with S. Alan Skinner) Research design and Artifact assemblage In Archaeological Investigations at the Ashtrap Site, Idaho. Report submitted to the U.S. Department of Agriculture, Forest Service, Ogden, Utah, by Environment Consultants, Inc., Cultural Resources Report 81-25.
- 1981 Letter report for cultural resources survey in Mt. Pleasant Texas. Submitted to City of Mt. Pleasant, Texas, by Environment Consultants, Inc.
- 1981 (with Sharon Judd, Joe Kaskey, Janis Raley, David Shanabrook, and S. Alan Skinner) Cultural resources survey of the Dallas Floodway Extension. Report submitted to the U.S. Army Corps of Engineers, Fort Worth, Texas, by Environment Consultants, Inc., Cultural Resources Report 81-26.
- 1981 (with S. Alan Skinner, A. Binion Amerson, Timothy A. Gregory, and James T. Ingraham) Archaeological survey and testing at Felsenthal National Wildlife Refuge, south Arkansas. Report submitted to U.S. Department of Interior, National Park Service, Albuquerque, New Mexico. Environment Consultants, Inc., Cultural Resources Report 81- .
- 1981 (with James T. Ingraham and S. Alan Skinner) Cultural resources overview of South Henderson and Shiloh Prospects, Texas. Report submitted to Normandeau Associates, Inc., Richardson, Texas. Environment Consultants, Inc., Cultural Resources Report 81- .



- 1983 (in draft) Major author on Archaeological data recovery of seven sites at proposed Bay Springs Lake, Tishomingo County, northeast Mississippi. Report to be submitted to U.S. Army Corps of Engineers, Nashville District. Environment Consultants, Inc., Cultural Resources Report 83- .

Papers Presented:

- 1979 Applications of Stereologic Methods in Standardizing Information on the Inclusions of Grog-Tempered Prehistoric Ceramics at the Toltec Site, 3LN42, presented at the Arkansas Academy of Science.

References:

Dr. Michael P. Hoffman  
Department of Anthropology  
University of Arkansas  
Fayetteville, Arkansas 72701

Dr. Allen P. McCartney, Chairperson  
Department of Anthropology  
University of Arkansas  
Fayetteville, Arkansas 72701

Dr. L. Mark Raab, Director  
Archaeology Research Program  
Department of Anthropology  
Southern Methodist University  
Dallas, Texas

## VITA

Maria Campbell Brent

### Personal:

Date of Birth	April 1, 1952
Place of Birth	Mt. Pleasant, Michigan
Status	Married
Spouse:	Joseph E. Brent

### Fields of Interest:

Anthropology, archaeology, scientific illustration

### Education:

B.A.	Anthropology	Central Michigan University	1975
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### Employment:

1982-Present	Crew Chief, Environment Consultants, Inc., Dallas, Texas. Bay Springs Lake Archaeological Project, mitigation of seven sites, Tennessee-Tombigbee Waterway, Mississippi.
1982	Artist, Centuries Research, Inc., Montrose, Colorado. Artifact illustration, general drafting.
1981	Crew, Centuries Research, Inc. Survey of Upper Dry Fork Reservoir, DeBeque, Colorado
1981	Crew, Centuries Research, Inc. Trough Hollow Project survey, Fishlake and Manti-La Sal National Forest, Utah.
1981	Crew Chief, Centuries Research, Inc. Survey and testing in the Routt, Gunnison and Uncompahgre National Forests, Colorado.
1981	Crew Chief. Centuries Research Inc. Excavation of an historic site, Ouray, Colorado.
1981	Crew Chief, Environment Consultants, Inc., Dallas, Texas. CSO Block Survey, Campbell County, Wyoming.
1980-1981	Crew Chief, Environment Consultants, Inc. Sterling Hydrocarbon gas line survey, northcentral Texas.

- 1980 Crew Chief, Environment Consultants, Inc. Kaufman County Electric Cooperative powerline survey, east Texas.
- 1980 Crew Chief, Environment Consultants, Inc. EXXON Coal Lease, Troup, Texas.
- 1980 Crew, South Dakota State University, Northern Border pipeline survey and testing, northeastern South Dakota.
- 1979 Assistant Crew Chief, Washington State University, Dolores Archaeological Project, Dolores, Colorado. Excavation of surface rooms and pit-structure.
- 1974-1975 Instructor, Michigan Technological University. Excavation of the Cliff Mine site.
- 1973 Crew, Museum of Northern Arizona, Flagstaff, Arizona. Excavation of historic and prehistoric sites in Zuni, New Mexico, and Grand Canyon, Arizona, also general laboratory work.
- 1972 Crew, Field Museum of Natural History, Chicago, Illinois. Excavation of a small pueblo-Kiva complex in Hay Hollow Valley, Snowflake, Arizona.
- 1971 Crew, Central Michigan University Field School. Excavation of Late Woodland Burial Mounds, central Michigan.

Publications:

- 1981 (assembled by S. Alan Skinner) Cultural Resources Survey of the Troup Mine, Texas. Environment Consultants, Inc., Cultural Resources Program, Report 81-6.
- 1981 Archaeological Survey of the Sterlin Hydrocarbon and Matador Pipelines, Texas. Environment Consultants, Inc., Cultural Resources Report 81-13.
- 1982 (in preparation) co-author, Archaeological Data Recovery at Seven Sites, Bay Springs Lake Area, Tennessee-Tombigbee Waterway, Tishomingo County, Mississippi. Environment Consultants, Inc., Cultural Resources Program Report.

Graphic Skills:

Scientific Illustration: Archaeological and Biological.  
 Silkscreen.  
 Dry Transfer lettering, charts and graphs.  
 Calligraphy.

References:

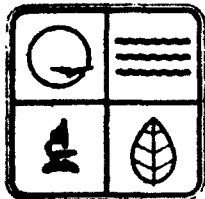
Dr. Karen Chavez

Central Michigan University  
Mt. Pleasant, Michigan 48859

Dr. William Lipe  
Washington State University  
Pullman, Washington 99163

## **APPENDIX G**

**Comments from Missouri Department of Natural Resources  
and Response from Jeyne Bennett, Principal Investigator**



June 6, 1984

MISSOURI DEPARTMENT OF NATURAL RESOURCES  
P.O. Box 176 Jefferson City, Missouri 65102 (314) 751-2479

Mr. Sam R. Morgan  
Chief, Planning Division  
Memphis District, Corps of Engineers  
668 Clifford Davis Federal Building  
Memphis, Tennessee 38103

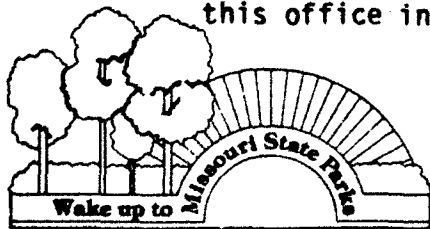
Re: Cultural Resource Mitigation Report for Ditch 19,  
Dunklin County, Missouri

Dear Mr. Morgan:

The Historic Preservation Program has reviewed the May 1984 draft report entitled "Cultural Resources Mitigation (Stages I and III) Along Ditch 19, Site 23DU227, Dunklin County, Missouri" by Jayne Bennett and David Higgenbotham. Based on this review, we find that not all of the comments provided in our original review dated 9 September 1983 have been addressed. Therefore, we still have the following comments regarding the second draft of this report.

1. Comment #1 has not been addressed, that is, the title of the report does not accurately describe the scope of the project, as the meaning of "Stage I and III" is not clear.
2. Comment #3 has not been addressed, that is, the Prehistoric and Historic Review sections are very limited and fail to indicate and an in-depth effort on the part of the authors to familiarize themselves with Missouri archaeological history.
3. Comment #4 has not been addressed, that is, the previous work performed by dioquois should be discussed with some detail.
4. A Cultural Resource Survey Summary Sheet has submitted to this office.
5. Page 100, Conclusions and Recommendations, it is the responsibility of the investigators to submit archaeological site forms to the Archaeological Survey of Missouri (ASM) and request number assignments for new sites. The investigators must also submit copies of new and revised ASM site forms to this office.

In conclusion, we find that although some improvement has been made in this report, is still fails to meet current professional standards for reporting cultural resource management projects. It is recommended that the report be revised, this time incorporating all above listed comments, and resubmitted to this office in draft form for further review. Until receipt of an acceptable



Christopher S. Bond Governor  
Fred A. Lafser Director

Division of Parks and Historic Preservation  
John Karel Director

Mr. Sam Morgan  
June 6, 1984  
Page 2

report, no action should be taken which would foreclose the opportunity for the Advisory Council on Historic Preservation from commenting upon the proposed undertaking.

If I can be of further assistance, please call 314/751-4096 or write.

Sincerely,

DIVISION OF PARKS AND HISTORIC PRESERVATION

A handwritten signature in black ink, appearing to read 'Michael S. Weichman', with a long horizontal flourish extending to the right.

Michael S. Weichman  
Chief, Review & Compliance

MSW:jdc

cc: Jimmy McNeil

# AR Consultants

Environmental Management and Consulting Services

P. O. Box 820727, Dallas, Texas 75382-0727

Phone: (214) 368-0478

July 2, 1984

Mr. Michael S. Weichman  
Chief, Review and Compliance  
Missouri Department of Resources  
P. O. Box 176  
Jefferson City, Missouri 65102

Dear Mr. Weichman:

The letter dated June 6, 1984 provided four comments in regard to the May 1984 draft report "Cultural Resources Mitigation (Stages I and III) along Ditch 19, Site 23DU227, Dunklin County, Missouri" by Jeyne Bennett and David Higginbotham. Responses to each of these comments are provided in the following letter.

Comment 1 -- Because there is confusion as to the meaning of the phrase "Stages I and III" in the report title, I have deleted that phrase. Cultural resources mitigation is used as that defined in the Scope of Work and in "The Management of Archeological Resources: The Airlie House Report" edited by Charles R. McGimsey, III and Hester A. Davis. Full reference is provided in the references section of the report. In the Scope of Work in Appendix A of the report, refer to section C-3.2 for full definition.

Comment 2 -- The "Culture History" section in Chapter II of the report is deliberately sketchy. It was not even a stated part of the Scope of Work, and its intent was general reference. The culture history in the report was the accepted culture historical references of the area which are cited fully in the "References Cited" section of the report.

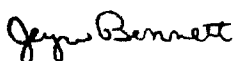
Comment 3 -- The previous work by Iroquois at the site is discussed on pages 1, 3 (site map), and 6 of the report. The culture history section brings in data provided by Iroquois on the area.

Comment 4 -- It is my understanding that a Cultural Resources Summary Sheet is not necessary since this is a mitigation project.

Comment 5 -- After reanalysis, the recommendation that the area investigated at 23DU227 be a separate site has been withdrawn.

I appreciate the opportunity to respond to the comments. The letter providing the comments and this response have been made a separate appendix to the report.

Sincerely,



Jeyne Bennett  
Principal Investigator